MAY 1998

Personal Computer World

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Call 01483 733870.

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Editorial

Few computer magazines can claim to be ten years old. Only one can boast about being 20 years old. The magazine in question is, of course, *PCW* and you're holding our 20th Anniversary issue in your hands. *PCW* was launched in 1978 as the first dedicated personal computer magazine in the UK. The first issue was put together by its founder, Angelo Zgorelec, and timed to coincide with the launch of "Britain's own microcomputer", the NASCOM 1. The first issue sold out of its 30,000-copy print run, went monthly from the second edition and has not looked back since.

To celebrate, we've put together a special section (starting on page 71) looking at the past 20 years of personal computing and the evolution of key companies and products. We've asked our founder how it all began and we've taken a look into what the future might hold.

While our anniversary is an event of which we're very proud, you can be sure it has not got in the way of providing you with the monthly buying advice on which you've come to rely. In fact, we've used our 20th anniversary as the perfect excuse to conduct our biggest-ever PC group test of no less than 20 systems.

Can't decide how much to spend on your new PC? No problem. We've reviewed five systems at four popular price points from £500 to £2,000. Prepare to be surprised at the quality of the entry-level £500 systems and the sheer power of those weighing-in at £2,000. If you fancy something in-between, check out the great value offered in the £1,000 and £1,500 price points.

Handhelds have never been as flexible nor powerful so we thought it was about time we rounded up and compared the latest contenders. Check out this month's PDA group test to see which best suits your pocket.

If you've already bought a PC we want to hear about it. Our reliability survey (p180) gives you the chance to tell us what you think of your PC, printer and ISP.

We've thoroughly enjoyed reporting on PCs over the past two decades and look forward to continuing to provide you with the best buying advice, reports and cutting-edge features in the future. Thanks for reading *PCW* and here's to the next 20 years.

Gordon Laing

Managing Editor

Next Month

333MHz Pentium IIs

All the threes next month as we group test PC systems based around the powerful, yet affordable 333MHz Pentium II processor.

Desktop Publishing

Layout and relax as we guide you through the best in desktop publishing packages. We look at packages starting at as little as £50 and going right up to the sort of systems we use at *PCW.*

Accounting

If your finances just do not add up, it could be time to invest in accounting software. We do the sums on packages which are suitable for small to medium-sized enterprises.

June '98 issue

■ On sale Thursday 30th April

** Next month's contents subject to change.*

Personal Computer World

May Cover disc

Welcome to the 20th Anniversary *PCW* CD-ROM. This month we have not only demos of some of the latest games and software around, we also have some classic software and games from those famous machines of the past 20 years, specially packaged to run on your PC.

System requirements

You need a PC with Windows 3.1 or later and a colour VGA display. For best results run our CD-ROM on a Pentium PC with at least 16Mb of memory.

How to use the CD-ROM

1. Quit existing applications. If you have 16Mb or more of memory you don't have to do this but you will get better performance if not too many other applications are running.
2. Put the disc into your CD drive:

• Windows 95 — If you've got Win95, the *PCW* interactive loader will appear on your screen. If your CD doesn't autoload, go to Start/Run and type

```
<CD Drive>:\pcw.exe
```

• Windows 3.1 — From Windows Program Manager choose File/Run, then type

```
<CD Drive>:\pcw.exe
```

and press enter.

Uninstalling Software

Please note that VNU Business Publications takes no responsibility for damage caused to computers, or to the data contained on them, as a result of following these instructions. This information is supplied by popular request to assist readers with the management of their machines. Before removing anything from your system, make sure you are confident about what you are doing and that your data is adequately backed up. Deleting anything from your system could result in errors.

Uninstall menu option

Contemporary software will often create an UNINSTALL option in its program or menu group at the time it is installed. By selecting UNINSTALL from the menu when you no longer want to use the application, a program will be run that will remove all the files, icons, and menu entries it added to your system during its installation. This is the best way to remove an unwanted application and should be your first choice.

Windows 95 file management

This method is the best alternative to running a supplied uninstall program but depends on Windows 95 having kept a record of the installation.

If you are using WIndows 95, and no UNINSTALL menu item is created, you may be able to get Windows 95 to tidy up for you by following these instructions:

1. Click on the START button, select SETTINGS and then CONTROL PANEL.
2. In the CONTROL PANEL window, click on ADD/REMOVE PROGRAMS.
3. From the grey box, scroll through the list that is displayed until you find the application you want to remove and then click once to highlight.
4. Click on the ADD/REMOVE button in the bottom right corner of the grey box — the uninstall program will run.

Other removal options

Some software will only be installed into its own specially-created directory. If no STARTUP options or menu groups were created by the installation, simply deleting the directory will remove all files that were added to your system. *NB: This method should be used with care!*

Unexpected leftovers

If, after having deleted a directory, you find that the program still shows in your START MENU, or you get messages looking for the application every time you restart your machine, you may have to remove the entries manually:

1. Click on the START button, select SETTINGS and then TASKBAR & STARTMENU.
2. On the grey box which appears, click the START MENU PROGRAMS tab.
3. Click the REMOVE button.
4. From the displayed list, select the program you want to remove then click the REMOVE button at the bottom of the box. The entry will be deleted from your STARTMENU.

Programs which run every time you start your machine may be found in the specially-named sub-folder called STARTUP.

Important notice

The publisher, VNU, has checked the Personal Computer World CD-ROM for known viruses at all stages of production but cannot accept liability for damage caused either to your data or your computer system which may occur while using either the disc or any software contained on it. ***If you do not agree with these conditions you should not use the disc.*** It is good practice to run a virus checker on any new software before running it on your computer and to make regular backup copies of all your important data.

• *Unless otherwise stated, all software contained on the CD is for demonstration only. This means it may be restricted in some way: it may, for instance, be time limited or have certain functions disabled.*

Getting *your* software on to our CD

Personal Computer World is keen to promote quality software and would like to hear from you if you are interested in having your product included on a future cover disc. Please telephone **Afshan Nasim** on 0171 316 9761 or email afshan_nasim@vnu.co.uk

Technical Helpline 01274 736990
Calls cost 50p per minute

CD-ROM problems

Our technical helpline (01274 736990) is open weekdays, from 10.30am to 12.30pm and from 1.30pm to 4.30pm. Calls cost 50p per minute.

If you experience problems with the CD-ROM: perhaps a message such as "Cannot read from drive D:" please return the disc with a covering note bearing your name and address, and clearly marked **PCW CD May 98** to: **TIB plc, TIB House, 11 Edward Street, Bradford, BD4 7BH**. A replacement disc will be posted to you.

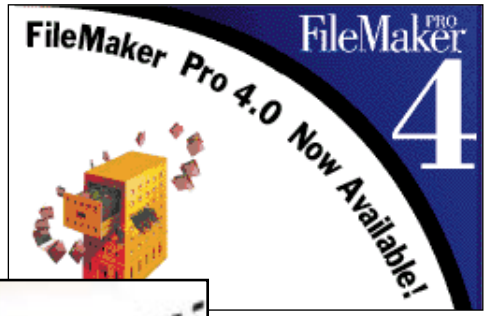
Using a better version of the Jedi Knight engine, you can really gain control

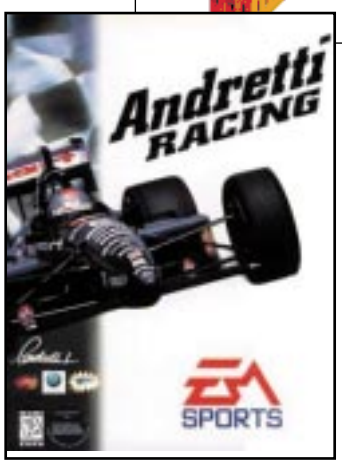
Follow in the tracks of Jacques Villeneuve in this Indy Car racing game

Hands On

The Hands On section of our CD brings you the entire contents of the past 12 months' of *Hands On* from the magazine, in a fully searchable format using Adobe Acrobat. The files are sorted into chronological order under their section headings. These include in-depth facts, tutorials and workshops across diverse topics such as Visual Programming, Word Processing, 3D Graphics and Sound.

Please note that if your installed version of Acrobat is less than version 3.0, you may get error messages accessing these files. You can upgrade your version to Acrobat Reader 3.0 by installing it from the Utilities section of the Software Library.





Featured software

FileMaker Pro 4.0 (Windows 95 only). This package provides easy information management by allowing FileMaker Pro databases to be viewed and modified within web browsers. You can also transform Excel spreadsheet documents into fully functional FileMaker Pro databases in seconds. Other features include the ability to store GIF / JPEG images, and exporting databases directly to HTML tables.

Featured games

Jedi Knights Mysteries of the Sith

Mysteries of the Sith uses an enhanced

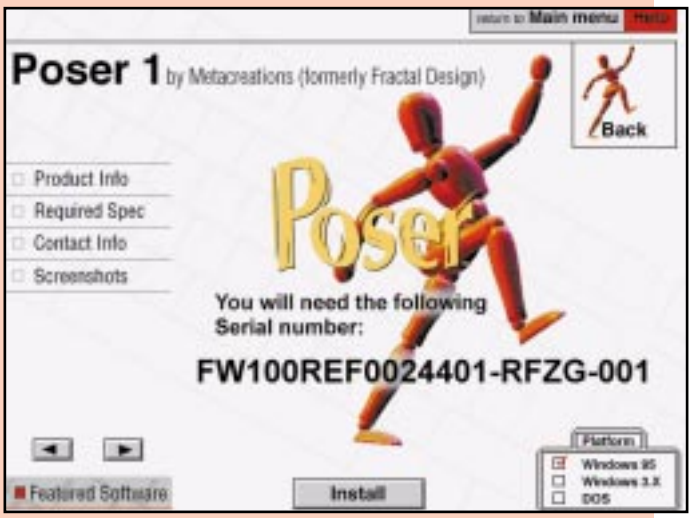
Poser1: full version

You will need the following serial number to run and install Poser1:

`FW100REF0024401-RFZG-001`

Poser1 provides digital artist's models that let you integrate the human form into illustrations, 3D scenes and graphics. Essentially a 3D modelling and rendering application, it helps users create an infinite variety of body figures which can be posed, rendered and incorporated into designs. Poser1 allows graphic designers and illustrators to accurately draw the human form. This is the full version of Poser1 but if you like the program enough, the latest version, Poser 2, adds the benefits of animation, new characters with clothing, the ability to add props, the ability to substitute 3D models for body parts, and powerful import/export capabilities.

Upgrade to version 2 for only £59 (ex VAT) (£78.14 inc delivery and VAT) Please call Upgrades Unlimited on 0181 358 5855.



Technical Helpline 01274 736990

Calls cost 50p per minute

p16 ➢

version of the Jedi Knights engine. Amongst the new features are better sabre control, advanced networking, coloured lighting support, improved artificial intelligence and better internet cheating protection.

You play Kyle Katarn and, as Imperial troops launch a surprise attack against the base, you must help to repel the invaders. Find your way to an Imperial Shuttle on the far side of the compound and you will be able to counter-attack the Imperials in subsequent levels.

Andretti Racing

Andretti Racing is an excellent racing game with many realistic gameplay options. The game sets you on a career in stock car and Indy Car competition. If you do well during one season, a new company may offer to sponsor you, changing your car as your career progresses.

Sega Touring Car Championship

(Windows 95 only). This Sega's conversion of its Touring Car racing game, from the Saturn to the PC. The demo lets you play a single two-lap race, choosing from four different cars. Other features include two-player split-screen action and network play, eight-player Network Play via TCP/IP, IPX, modem or serial link, and excellent 3D sound.

Top Beware of danger in the Wolfenstein prison
Middle Get to grips with Doom again
Bottom Quake in your boots while you play the original and await the new release: Quake II

Technical Helpline 01274 736990 **Calls cost 50p per minute**

WINCheckIt 4: full version

You will need the following Serial code to install and run WINCheckIt:

```
W4-1315792
```

WINCheckIt is an all-in-one Windows problem solver; a comprehensive tool for use with your PC which enables you to troubleshoot hardware problems, clean up disk space, resolve setup conflicts, free-up Windows memory, analyse system performance and rescue startup and INI files. Featured on the disk is the full version 4 and from this readers can upgrade to version 5.

CheckIt version 5 features a new approach to troubleshooting which finds problems and leads the user directly to the tools that can provide the solution. First, QuickCheck tests and locates problems automatically. If a problem is detected, whether it is a hardware glitch, setup conflict or change in performance, the program's exclusive Troubleshooter guides the user to the tests and information needed to solve it quickly. These include powerful hardware tests, extensive system information and a fast, easy way to compare system changes.

No other program provides such precise system information, whether the user wants an overall summary of their system, or

specific details about a particular component. CheckIt's Find It feature allows users to search for the specific information they need, rather than having to look through pages of system information. In all, CheckIt offers over a dozen comprehensive information displays, identifying everything that users need to know about their motherboard, memory, modem, drives, video, ports, printer and internet connections.

CheckIt 5.0 has a recommended retail price of £49.99 (incl VAT) and CheckIt Professional Edition is £99.99 (incl VAT). An upgrade is available for existing CheckIt 4.0 users (Win95) priced at £29.99 (incl VAT). Existing CheckIt Diagnostic Kit users can upgrade to CheckIT Professional Edition for £49.99 (incl VAT) by calling 01494 455560.

Featured id classics

To celebrate *PCW*'s 20th Anniversary we bring you the original demo versions of three of the the legendary games from id Software and preview screens of the forthcoming and long-awaited Quake II.

Wolfenstein 3D As an escapee from a Nazi prison, you move smoothly through a 3D world full of detail and animation.

Doom A technological breakthrough in combat action games, Doom introduced a new 3D graphics engine that set the gaming world on fire.

Quake Just when you thought it was safe to go back to the keyboard, id Software released another game — one that was to prove more popular than either Doom or Doom II.

Software and Retro Library Contents

Our Software Library has passed through a bit of a time-warp this month. As part of *PCW*'s 20th Anniversary, we have created a special Retro section which contains an abundance of old and new versions of some of the classic games and software from bygone days.

For those of you who remember the joys of hammering away at the rubber keys of a Sinclair Spectrum or waiting impatiently for the Commodore 64 datasette to load up the latest game, take a look in the emulators section. Here you'll find a crop of ZX81, Commodore 64 and Spectrum emulators as well as some classic Jeff Minter games (remember "Attack of the Mutant Camels"?) to play on them. You're in serious danger of suffering nostalgia overload!

● *Many thanks to Tulip Computers and Amstrad for giving us permission to place the emulated ROMs on the CD.*

Staying traditional, we've got full versions of the grandfather of all adventure games: Zork Parts 1 and 2, courtesy of Activision. Get ready to "go North".

If you prefer your nostalgia with a modern twist, check out a range of fresh takes on the old classics with BrainWave (Galaxian), AstroFire (Asteroids), and Microsoft's Return to Arcade (Pacman).

Don't forget, you can find all the usual essential utilities in our Software Library, along with the latest crop of new titles. Mixman Studio enables anyone to create and play CD-quality music. PAYE Master is a flexible and speedy approach to payroll processing. GPSS is Global Positioning Software that you can use on the desktop as well as on the road and iTV is a special internet browser that tells you when your favourite TV programmes are on, and more.

Retro Software Library

Emulators

- Win64 / Win95 Commodore 64: a Windows version of the Commodore 64 emulator. Run this program and then use it to run Commodore games in our Retro Library Games section.
- Commodore 64 original games by YAK: a standalone package with the integrated OS and original versions of C64 games.
- Spectrum popular original games by YAK: a standalone version of a Spectrum emulator with integrated original Spectrum games.
- X128 DOS Spectrum emulator: a DOS version of the Spectrum emulator. Run the program and then use it to run Spectrum games contained in our Retro Library Games section.
- Z80 Spectrum emulator: an alternative DOS version of the Spectrum emulator. You can use this program instead to run our Spectrum games.
- ZX81 emulator: a DOS version of the ZX81. Run this emulator and then use it to run our ZX81 games.

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May 1998

PCW INTERACTIVE

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id CLASSICS
Wolfenstein 3D, DOOM, QUAKE

Personal Computer World

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Software Library

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Atoms	—	Interactive graphical atoms demo
Cachecheck	—	Cache Analyser
DirectX	—	Microsoft multimedia drivers
GDidb	—	Create web sites from databases
GPSS	—	Satellite navigation software
Internet Explorer	—	Latest Microsoft Internet browser
iTV	—	Internet TV listings from the web
Mixman	—	Music-making software
Nico's Commander	—	File manager
Norton Anti Virus	—	Anti virus software
Paintshop Pro	—	Paint package
PAYEMaster	—	Payroll software
WinZip	—	File compression utility

Retro Software Library
Win64 / Win95 Commodore 64 emulator
X128 DOS Spectrum emulator
Z80 Spectrum emulator
ZX81 ZX81 emulator
AstroFire
Brainwave
Brainwave 2
Commodore 64 original games by YAK
Invaders 78
JumpStar
Llamatron
Microsoft Return to Arcade
Revenge of the Mutant Camels
Spectrum popular original games by YAK
Terrafire
Zork1
Zork II

Games

- AstroFire — Fast and furious update of the classic Asteroids.
- Brainwave — Battle for the Mind.
- Brainwave 2 — Return of the Nanabots.
- Invaders 78 — A version of Taito's original Space Invaders, for the PC.
- JumpStar — Hostile creatures on alien worlds in this side-scrolling arcade game.
- Llamatron — PC Version of a Jeff Minter classic.
- Microsoft Return to Arcade — Trial of Microsoft's compendium featuring PacMan.
- Revenge of the Mutant Camels — a PC version of another Jeff Minter classic.
- Terrafire — Blast your ship through heavily defended underground caverns.
- Zork1 — This is the full version of the original PC DOS classic "The Great Underground Empire". Zork1 is a text-based adventure game. Quite fascinating. (A clue: go north).
- Zork II — The second (and full) version of the above classic. No clues this time.

Web access

If you have an internet connection, you can access our *PCW* web site direct from the CD. Ensure your connection is open and click on the bar on the opening screen of the CD.

vnunet www.vnunet.com Europe's largest IT and business publisher is online at vnunet. The site contains minute by minute news updates, via our Newswire Service, and some of the best editorial features from VNU's 15 printed publications.

Jobworld www.jobworld.co.uk Jobworld is the fastest, most convenient internet recruitment site, displaying real-time contract and permanent vacancies. Free to UK and international job-seekers, Jobworld carries thousands of IT contract and permanent vacancies, including permanent vacancies in accountancy and management consultancy. To find the right job for you, apply online there and then. Or, register for our email alert service, which posts vacancies direct to your mail box.

Cover stories

Maybe you remember the first issue of *PCW* from 20 years ago? You almost certainly remember some of the important events that have happened along the way, like the first IBM PC, Windows and multimedia. We have been there all along and here you can view 25 covers which featured these events.

Infopedia UK

On our front cover, there's a full version of Infopedia; a compilation of best-selling reference works. This version is available in the shops for £39.99 (if you bought all the separate works they would set you back around £300) — but this is yours, FREE with *PCW*.

Infopedia is perfect both for study and for general reference. It is based around the *Hutchinson New Century Encyclopaedia* (all 12 volumes of it) and you get seven other essential reference works: Longman Dictionary of the English Language, Bloomsbury Thesaurus, Bloomsbury Dictionary of Quotations, Hammond World Atlas a three-volume Concise Dictionary of National Biography, Hutchinson Concise Dictionary of English Usage, Hutchinson Info '96 (a yearbook, almanac and fact finder).

There are over 250,000 entries in Infopedia, along with 5,000 photographs, over 150 videos, 450 sound clips, as well as narrations and 3D animations.

All the reference books are accessible from the same interface, which makes learning about and using Infopedia easy. When Infopedia is run for the first time you are welcomed by the on-screen librarian and a stack of books. Click on any book and the librarian will explain about the book's contents.

You can access the information in Infopedia in several ways. You can browse an alphabetical list of all the topics in the whole reference collection or type-in a word for whatever you are interested in.

In search view you can find entries which contain a specific word or phrase. You might type in "London" and be directed to references in the encyclopaedia, on the map, and even to some quotations. All the information you may need for that article, essay or report, plus a few pithy quotes to add lustre, and all at a keystroke or two.

You can, of course, browse a particular book, or look for information by subject, or even by just those entries which are accompanied by photos, videos, maps, sound bites or an animation.

In the video section there is plenty from which to choose: Margaret Thatcher's resignation; the Beatles receiving an MBE from the Queen; the Berlin Wall coming down; or the first lunar landings.

There are sound clips of Mahatma Gandhi and Noel Coward, to name but two.

A neat feature is Project View which lets you create your own list of entries. For example, if your were writing a paper about UK Prime Ministers, you could create a list of entries in the form of a timeline. In other words, Infopedia has everything you could want from a reference work. In fact, it is a whole bookshelf of indispensable reference titles all on one CD which is quick and easy to search.

Systems requirements: Windows 3.1, 95 and Mac System 7.1; 486 or higher; 8Mb RAM; mouse; sound card; double-speed CD-ROM drive or better. Please ensure you have loaded the latest drivers for all devices to avoid compatibility problems. CD-ROM support i available on 01274 736990.

■ *Infopedia is only available to* PCW *subscribers or from issues bought off UK newstands.*

Technical Helpline 01274 736990 **Calls cost 50p per minute**

Win a trip for two to New York **with AOL**

Fancy a free trip to the Big Apple? *Personal Computer World* and AOL, the world's biggest internet online service, have teamed up to bring you a fantastic competition this month. Try AOL's free 50-hour trial and you could be a winner!

First prize is a short break for two to New York! From the glittering signs of 42nd Street, to Carnegie Hall, to the largest selection of museums and galleries in the US, NYC has something for everyone. Second prize winners will get one of five free AOL accounts for a year, while 25 lucky third prize winners will walk away with a year's free subscription to *Personal Computer World*.

How do I enter?

All you have to do is install the cover CD and you are less than five minutes away from your 50-hour free trial. Once you are online, click on the K (for Keyword) on the menu bar and type AOL WIN. Then follow the simple instructions to enter the competition. It's that easy!

Note the closing date is 31st May 1998. (See "Competition Rules" online for full details).

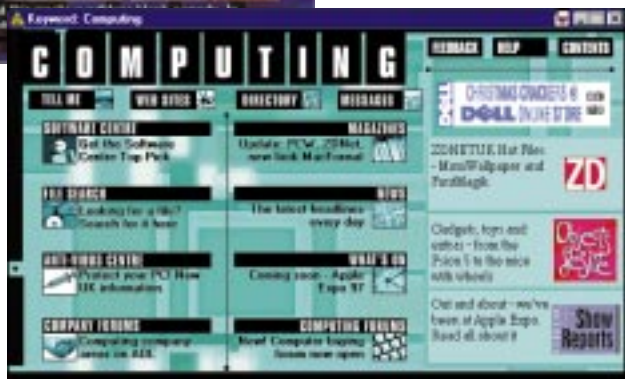
What is AOL?

AOL is a fun, affordable, easy-to-use information service covering everything from the latest News & Sport to Travel & Entertainment — and all of it is bang up to date! It is also the service on which you can communicate with fellow users by sending and receiving messages quickly and easily (like sending a letter but without the wait, or phoning long-distance for the price of a local call).

Now boasting more than 11 million subscribers worldwide (over 350,000 in the UK) AOL brings you far more than the internet, thanks to a vast selection of exclusive areas. Take a look at the 14

The Statue of Liberty would be clearly within your sights, if you won our fabulous trip to New York

expanded AOL channels — AOL offers something for everyone. The content and programming is developed locally by AOL UK and its team of partners, including some of the world's top media brands such as Lonely Planet, The Economist Intelligence Unit and Thomas Cook.



Take your pick: all hobbies and special interests are featured within AOL's up-to-date pages

AOL's unique features

So what exactly are you missing out on? Well, for starters, your AOL account gives you five different screen names or email addresses which you can choose yourself. This way, you can have one for business one for pleasure, and one for perhaps each member of the family. Your screen name then becomes your email address by adding @aol.com to the end.

Get creative with your email by editing it to your personal taste: you can choose from a huge range of background and text colours. Add bold type and italics or whatever you like! Instant Messages give you the ability to have a one-to-one conversation with your AOL friends anywhere in the world in real time! You can even create a Buddy List to find out when your friends are online. When they sign on to AOL, their names appear in the Buddy List window to let you know they are online at the same time as you.

With your AOL Account you are given a generous 10Mb of web space, so why not create your own personalised web site? AOL even provides you with online tools to help you! Try out (Keyword:) Personal Publisher to get started, or (Keyword:) AOLPress for more advanced tools. To access Keywords just hold down your Control Key and press K, then type the Keyword and you'll go straight to that area.

Other cool features include the Favourite Places function that lets you earmark a web site, email or instant message for future reference. The Parental Control feature allows you to block various types of access to the net, such as downloads from Newsgroups or Chat rooms, or you can block all internet access so that the kids can play safely.

What's new?

AOL's great Windows 95 version has Microsoft Internet Explorer 3.0 integrated as its main browser — see the enhanced HTML features of Internet Explorer in action! Using it means that most web pages will look the way they were intended to, instead of missing bits here and there. And check out AOL's powerful new search engine. AOL NetFind™ is the easiest, most comprehensive way to find what you are looking for, fast! Whether you're looking for phone numbers, email addresses, Newsgroups on quilting, or web sites for kids, AOL NetFind™ can help you.

If you'd like a quick tour around the service once you've signed on for your free trial, then go to (Keyword:) TOUR. So go ahead! Sign on to AOL now and enter our competition — you could soon be winging your way to New York.

Just take a look at what's up for grabs in this great competition

- *Free* — 50 hours online!
- *Free* — One month's AOL membership!
- *Free* — Five email addresses per account!
- *Free* — Technical support!
- *Free* — 10Mb of web space!
- 100 percent local call access

Sign up for your free trial now!

Competition Rules and How to Enter

- All entries must be made by midnight 31st May 1998. Only one entry per household.
- Paid employees of AOL, VNU and their immediate families and agents are not eligible to enter. All winners will be selected at random.
- The short-break trip to New York is based on a three-night duration, staying in a luxury hotel for two adults prior to 30th June 1998 or any time during the period 1st September to 12th December 1998.
- The first randomly drawn entry will win £1,200-worth of Lunn Poly travel vouchers (which more than cover the cost of the trip to New York, as promoted, but vouchers can be used on a different holiday of the winner's choosing). The next five randomly drawn entries will each win an AOL account free for a year (excluding telephone connection costs) and the next 25 randomly drawn entries will each win a year's subscription to *Personal Computer World* magazine.
- No cash alternatives will be substituted for the prizes.
- Winners will be notified by post or phone within three weeks of the closing date.
- A list of winners can be obtained by sending a SAE to the promoters after the closing date.
- If you enter the competition by post, send your name and address details on a postcard, marking your entry "PCW Competition" and send it to: **AOL, 18-21 Cavaye Place, London SW10 9PG.** (Promoted by AOL, 18-21 Cavaye Place, London SW10 9PG).

Newsprint

Free web access

A Canadian company is offering free web access to anyone in the UK. You download software from www.xtream.com and fill in a lot of personal information which will be used to target advertising at you.

This advertising, said to occupy "at most" 15 percent of the screen, pays for the service from Colt Internet. Users are given a local number and a free email account.

Director Chris Sukornyk said: "We're able to offer a real service ... for users wanting to bypass the monthly fee."

Rattled Intel pitches to power the sub-$1000 PC

Intel has outlined its roll-out of new processors amid its most uncertain trading climate for years. Chip sales so far this year have been less than expected, partly because of the Far East slump.

But Intel seems to have been rattled by cheap highly-integrated processors from Cyrix, AMD and Centaur. It has gone downmarket with a processor called Celeron, a PII with no on-chip cache, which is intended to power a sub-$1,000 PC for home users. Intel will shortly announce mobile chips in two new packages: one a single edge connector and the other a cartridge.

There will also be three high-performance PII chips running at up to 400MHz, and an as-yet unnamed chip using the new Slot II. All the new range is based on the P6 architecture used in both the PII and Pentium Pro. There seems to be an element of wishful thinking in Intel's breakdown of the market. First reactions to Celeron were muted and the first PCs (from NEC in the US) announced that the chips were aimed at businesses rather than homes.

It is home users with their demanding games who have gone for the current generation of multimedia PCs. Word processing and spreadsheeting, which account for a huge proportion of business work, do not need top-spec PCs.

So, in going downmarket, Intel risks undercutting its own lucrative corporate market, at least until new applications such as videophoning are mature enough to create a market for the new fast chips. Microsoft and Intel announced they will work together to migrate to the desktop applications like computer-aided design which are currently run on expensive high-end machines.

Meanwhile, Intel was keeping tight-lipped about its plans for using its newly licensed StongARM technology (*see page 28*). Much of the information about the new Intel processors was confidential at press time. Watch out for more details next month.

Clive Akass

World view from IBM

The 1998 edition of IBM's two-CD World Book multimedia encyclopaedia goes on sale this month priced at £39.99. Watch out for a review in next month's *Personal Computer World*.

Microsoft hacked off as anti-Trust pressure grows

■ The Win98 launch looks like being as much of a cliffhanger as that of Win95, which was dogged by claims of monopoly abuse, writes *Clive Akass*.

Bill Gates had his back uncharacteristically against the wall last month when he defended Microsoft's record at a Senate Judiciary Committee hearing.

Ranged against him were Jim Barksdale of Netscape and Sun's Scott McNealy, who urged senators to encourage the Department of Justice to pursue its investigation of Microsoft. A new hearing of the DoJ case, which centres on the bundling of Gates' Explorer browser with Win95, is due on 21st April.

Many observers believe the case is bigger even than Microsoft in that it is testing the administration's ability to control the abuse of market power.

Win98 adds a whole new can of legal worms. It absorbs the browser into the operating system, which Gates argues plausibly is where it should be. But if the courts accept this, and also that Microsoft is abusing its market position, do they then ban a computing architecture on legal grounds?

Sue Pederson writes: An attack by hackers which crashed hundreds of NT net servers all across America appeared to be timed to coincide with Gates' Senate testimony.

The attack, which exploited a well-known weakness in NT, came only a week after a leading watchdog group warned of a "dramatic increase" in computer security breaches.

Meanwhile, two Californian high school students orchestrated what Defense Department officials called "the most organised and systematic" hacking yet of the Pentagon.

Reportedly under the tutelage of a hacker based in Israel, the pair logged on to at least 11 US military computers and accessed unclassified information.

● More than six in ten US organisations have suffered a computer security breach in the past year says a Computer Security Institute survey.

News edited by Clive Akass; news@vnu.co.uk Internet News edited by Adam Evans; adam_evans@vnu.co.uk

‘Electronic paper’ screens arrive earlier than expected

A revolutionary new display technology, highlighted two years ago in *Newsprint*, has borne fruit earlier than expected with a demonstration of a mono TV screen.

It uses a Light Emitting Polymer (LEP) screen developed by Cambridge Display Technology (CDT) in partnership with Seiko-Epson.

The prototype screen was only 2in wide and 0.07in thick but a 10in colour demonstration model is expected later this year. Commercial products should be available within five years.

Flexible LEP screens have been likened to electronic paper. They emit about as much light as a cathode ray tube and, like a CRT, can be viewed from any angle. Unlike a CRT, they need only a low drive voltage. The prototype had a response fast enough for video.

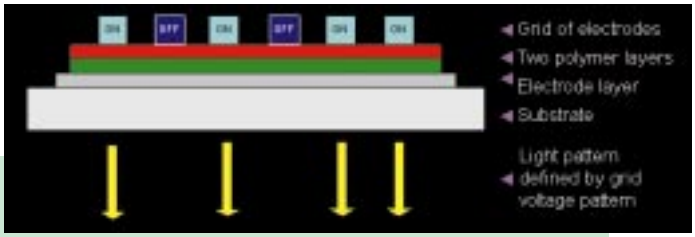
CDT has tended to be conservative about how soon products will emerge. The first were expected to be backlights and simple numeric displays and indeed these are already in the pipeline from Philips, which has also licensed the technology.

LEP screens are easier to make than LCD screens and so should be cheaper.

Clive Akass

● *See Tim Bajarin, page 28, and Caroline Swift, Fenwatch page 34*

CDT 01223 276351; www.cdtltd.co.uk



Light-emitting polymers behave much like the LEDs used as status lights: they light up when a forward voltage is applied. But LEPs can be produced as a flexible sheet and light up only at the point of electrical contact, so pixels that make up an image can be defined by a simply-made electrode pattern. An active matrix screen needs a self-contained transistor for each pixel. Current active-matrix screens convert into light only three percent of the battery power they drain; LEPs may increase this to 25 percent.

Short stories

400Mb per inch

■ IBM has developed a 1in hard drive holding up to 400Mb and costing as little as £120, say US reports. It is unlikely to ship until the middle of next year.

● 11.5Gb Maxtor drive, see p36

100MHz Socket 7

■ Elite released what it says is the first board with a 100MHz bus supporting Socket 7 processors.

Elite 0181 847 3332

Hang it all...

■ The Plasma Screen Company is selling the 6in x 42in Fujitsu Plasmavision 4203 for £7,800 (incl VAT). It can hang on a wall and is four times brighter than its £5,880 predecessor. You can hire the 4203 for £300 per day

PSC 0700 0752 762
www.plasmascreen.co.uk

Users get the pip as Apple knocks Newton on the head

■ Apple killed off its Newton-based devices last month amid a welter of appaling puns and protests. Apple invented the term Personal Digital Assistant for the original pen-based Newton, which failed largely because its handwriting recognition was not up to the job.

The move will halt production of the MessagePad range and the ergonomically excellent eMate, the best mobile design never to be sold as a mobile. Both use the Newton operating system.

Newton software developers picketed Apple, and there were predictions that some would offer to buy out the Newton.

Tim Bajarin writes: Jobs was not a fan of Newton, but he grudgingly acknowledged that the Palm Pilot (a usable implementation of the Newton concept) was catching on. This has led some to speculate that he will bring out a Pilot-like product that will use a sub-set of the Mac OS. Another idea apparently is a CE-type device that uses the sub-set.

However, the most likely scenario is that a business version of the eMate will emerge.

Apple 0181 569 1199

“I thought he realised the gravity of the situation”

p28 ➢

Tim Bajarin reports from the US

■ News of Cambridge Display Technology's plastic flat panel display (see p27) was greeted with interest in Silicon Valley, where various companies are working on next-generation portable devices for which the Light-Emitting Polymer screen has serious ramifications.

Some were surprised that the Japanese partner was Seiko-Epson. Yet, given Seiko-Epson's LED history, the move makes sense. You can imagine Seiko will find a way to use the screen in a Dick Tracey-like watch. Of CDT's list of investors (including Acorn's Herman Hauser and the group Genesis) no name spoke louder than that of Ester Dyson's, counsellor to the likes of Bill Gates, and the most powerful women in cyberspace: when she backs a technology, Silicon Valley listens.

■ The Networked Entertainment World conference is where Hollywood and Silicon Valley flush out ways to use technology creatively. This year news emerged that the LA area is being dubbed the Digital Coast to mark its "burgeoning new-media community". LA mayor Richard Riordan said: "Digital Coast companies exemplify the region's creative and entrepreneurial strengths."

LA is the movie and TV capital of the world and the content it produces is destined to become digital in a marriage of technology and the arts. The term Digital Coast is Hollywood's way of showing that it has finally joined the digital revolution.

■ Last month, I wrote of Intel's forthcoming Covington chip for low-cost PCs. Intel has resisted creating such products but had to get one out to stay competitive. The cacheless Pentium II will allow vendors to create PCs under $700 by the year's end.

Intel CEO Andy Grove told a semiconductor conference that Intel has other plans to cut PC costs. One is a project that integrates separate hardware functions and introduces software versions of hardware-accelerated functions such as audio or DVD. Intel has the low-cost religion and plans to be a major player in this area soon.

Elbow room for ARM

UK chip designer Advanced Risc Machines got a boost last month with news that Intel is licensing its StrongARM technology.

Neither company wanted to talk about plans for the chip as the deal needs federal approval. An Intel spokeswoman said: "We can see many interesting possibilities."

Digital and ARM developed StrongARM from an ARM core. Intel got a toehold on it in January as part of a $700m deal settling a long-standing patent dispute with Digital. It also licensed Digital's Alpha chip .

ARM's years of RISC design work has paid off with the interest in digital appliances. An oblique endorsement came last month when Digital's StrongARM team leader went to Cadence, an ARM customer which has just bought ARM's Cambridge neighbour, Symbionics (*see page 36*).

ARM md Robin Saxby shrugged off the demise of the Newton (*p27*); the highest profile Strong ARM user. "Newton accounted for only a small portion of our sales," he said. ARM chips were sold in 9.8 million devices last year: an increase of 134 percent. "R&D costs so much that it is simply not worthwhile for many manufacturers to invest in it when they can buy core designs from us," said Saxby.

ARM chips were in demand because they support many OSes and offer the best mix of price, performance and low power (250mw at 200MHz, less than a 20th of the drain of a notebook). "Things are going right for us," said Saxby.

ARM 01628 427700

Siemens (01344 396 396) **reckons it has its finger on the pulse of security with this sensor which packs a fingerprint digitiser onto a single chip to identify users.**

Light work for road controllers

■ Big business has a responsibility to help smaller companies address year 2000 (Y2K) problems, says Don Cruickshank, chairman of the DTI-sponsored Action 2000 Millennium Bug Campaign. He has called on larger firms to urge those "below them in the supply chain" to take action. One in three small businesses have made no preparations for Y2K.

■ The DTI is sponsoring a major EU Y2K conference in May. Public and private sector representatives from each member state will be invited to share their experiences and solutions. Slow-to-act member states will also be urged to set up their own national campaigns.

CONTACTS

Millennium Bug hotline: 0845 601 2000
DTI 0171 215 5000;

■ The *Users' Guide to Year 2000 Conformity,* which explains the Y2K problem and offers advice, is available from The Computing Services and Software Assoc. (0171 395 6710, www.csssa.co.uk/cssa) and the Federation of Electronic Industries (0171 331 2002, www.fei.org.uk/fei)

■ Sailors, pilots and walkers are the latest to be warned about the Y2K bug. It seems that older global positioning systems could go astray after 31st December, 1999. Receivers more than three years old may become completely disorientated.

■ Speaking of possible disasters, we had a call from a man in the Highways Agency saying that it had the Y2K bug well in hand.

"Nice of you to tell us," we said. But, er, why *are* you telling us?

"Haven't you seen the papers today? They're saying traffic lights will stop working," he said.

"Will they?"

"We're making sure that they'll work. We've had a standing committee working on the problem for a year."

There was not only lights to consider, he said. "We cover motorways, too. All the sign lighting, the fog warnings the flood…"

We think we'll take a rain check on that millennial outing, after all.

p29 ➢

Intuit's £1-a-minute support charge Quickens user pulses

A consumer rights group has lashed out at accounts software specialist Intuit for axing its free technical support line.

Intuit has begun charging £1 a minute (ex VAT) for phone support, claiming that only one in five customers used the free service so that it was effectively subsidised by the other four.

The new charge meant Intuit could cut the price of its flagship Quicken 98 product by £10, said Markus Reighwiesner, director of European marketing. "Most people are pretty good with a PC and prefer to use online help services. Why should they pay for something they are never going to use?"

But Alan Stevens, editor of Which? Online, the web version of the Consumers' Association magazine, says it shouldn't matter how many people used the service.

"What's relevant is that people get a good service. We think it's inappropriate and quite unfair for people to charge for technical support."

Both Sage and Microsoft offer 90 days' free support for their financial products to get customers through the teething problems which account for most calls. Then they charge.

"Ninety days pretty well covers it," says Gillian Kent, group marketing manager for consumer products at Microsoft. "It shows customers that you are looking after them…"

Intuit acknowledges that its service is expensive, but says the cost may drop if it can get a fixed-rate scheme with a phone company.

"It was never our objective to make money from it," says Reighwiesner. "If we charged less than 50p, 90 percent of it would go to the telecom provider. That wouldn't even cover our overheads."

Susan Pederson

Intuit 0800 585 058;
www.intuit.com;

The web version of the Consumers' Association magazine is to pilot a micropayments scheme which could be a pointer to the way much online material is financed in the future.

Reports from *Which?* and other CA publications will be on sale individually for a few pence, initially at Barclay Square <www.barclaysquare.com>. Limited access to the reports is also available at www.which.net.

Which? Online is also a service provider selling web access for £7.75 (incl VAT) a month, or £5.75 for subscribers to a printed CA magazine. These prices include unlimited access to the CA's online reports.

Which? Online 0645 830240

Mini-server takes on the copier

■ Vendors and users have long noted how many office machines duplicate functions like paper feeding, scanning and printing. The result has been a plethora of machines combining the functions of a fax, phone, copier and printer.

Fujitsu has taken a different approach with this Axis Network Scan Server, which works with various of its office scanners. The tiny box (*right*) is a computer with an LCD screen which acts as a supposedly foolproof scan management system for office networks.

A simple menu system gives you a choice of scanning to a file in a centralised management system which can be accessed by any authorised user. Or it can be sent as an email attachment offering a potentially cheaper and higher-quality distribution than fax. Or it can be scanned for viewing on any browser.

The Axis NSS costs £2,300 with Fujitsu's ten page-a-minute ScanPartner 10c colour scanner, or more with other models.

But if the box works as well as claimed, it can replace both a copier and a fax, making it far more cost effective.

Fujitsu 0181 573 4444

Short stories

56K (V90) pledge

■ The two companies behind the rival 56K technologies, now merged into a new standard called V90, say they have completed tests showing their products can interoperate.

The move by 3Com and Rockwell was designed to reassure users who are waiting for the technology to mature before buying a new modem.

■ Telefficiency claims its *e*Saver helps internet users cut phone bills by routing calls via the cheapest network. The device fits the modem and the phone socket. Telefficiency offers local call rates at a claimed 20 percent cheaper than BT's. Its ePlan 18, which includes the service and the device, is £18 per year.

Telefficiency 0800 980 5200

■ Sharedware offers two PCs for £320 more than the price of one. The money buys a kit consisting of a monitor, keyboard, mouse, ISA card, connection module and network cable.

Linked to an existing PC this gives an independent Windows 95 desktop and shared use of all peripherals.

Sharedware 01274 401 010
www.sharedware.com

p31 ➢

Novell plays wary over new common networking standard

Novell has backed a move, pushed by arch rivals Microsoft and Cisco, for a directory architecture that will allow different networks to work together.

Novell originally backed the move for a standard called the Directory Enabled Network (DEN). Last November it was endorsed by 150 other vendors including Hewlett-Packard, Intel and IBM.

But Novell was conspicuous in withholding public support. Its own NDS services face competition from Microsoft's forthcoming Active Directory, itself intended to improve interoperability.

In a further twist, Cisco is integrating its Internet-working Operating System with Active Directory.

Dominic Storey, Novell UK's director of technologies, said Novell held back until it received assurances that the specifications will be submitted to the independent Desktop Management Task Force (DMTF) standards body so "the chance of vendors hogging them for competitive means is eliminated."

The standard will enable network devices such as routers to be managed within directories in a uniform way.

Products adhering to the standard are expected in the first half of next year.

Linda Leung *VNU Newswire*

Business aid

The Government has set up a new body to nurture a UK software industry. The Software Business Network will provide advice, training and discussion, with some funding from Microsoft and British Telecom.

The plan is for local forums to co-ordinate events and services, with experts setting up meetings with potential investors.

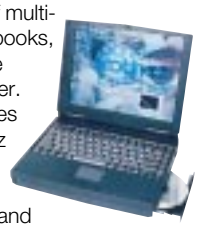
Image boost

UK designers were praised at the national Imaging Awards sponsored by Mitsubishi. Officials said the standard was "supremely high", with improved entries from educational establishments. Blackpool-on-Fylde College, described as "head and shoulders above the rest", carted off most of the educational honours.

Short stories

Oh Brother!

■ Brother has launched its new MX range of multimedia notebooks, aimed at the business user. The machines use 200MHz or 233MHz MMX processors and removable 2.0Gb hard drives



Brother 01279 416888
kyodai.brother.co.uk

■ Carrera has extended its PII range with the 333MHz Power Pro II with 64Mb SDRAM, 6.4Gb drive, and AGP graphics. Prices start from £1,799.

Carrera 0171 830 0586
www.carrera.co.uk

UPS is down

■ Home PCs can be protected from power surges and failures from as little as £100 with a new Power Start UPS range from Chloride Power Electronics.

CPE 01703 646 000
www.chloridepower.com

Rights and wrongs of BBC digital broadcasting

■ The BBC has set up a trial run of digital broadcasting. It is not yet open to the public but is a means of figuring out with programme makers, schedulers and rights people the issues that need to be resolved before the service is launched.

These include whether the entire back catalogue is available, whether all programming is available all the time, or whether slots are needed.

The rights side is perhaps more complicated: who gets paid how much and when for repeat screenings, and what constitutes a repeat screening.

The BBC, in partnership with Informix, has put infrastructure in place for transferring material into digital formats, editing and accessing the content, and finally presenting it to the viewer.

All digital material is currently stored in three formats, depending on how it will be viewed: MPEG2 for home use, MPEG for business and VXtreme for streaming over the internet.

The content is presented in a way that would be familiar to internet and CD users: there is a graphical interface, where you make choices by clicking on pictures and icons.

There is a variety of categories, such as drama, news, documentary and sport and some clever ways of getting to the footage you want to see.

For example, you can choose to see football matches by selecting dates and teams; or you can pick scenes or whole episodes from serials by specifying characters that may appear.

The BBC is adding "metadata" or editorial as it goes along, creating not only a comprehensive indexing system, but also creating pages about the programmes they are showing.

Content will not just be limited to TV programs, but the BBC's vast audio collections will also be available. As you might imagine, the service will have to use a broadband system but the BBC is not interested in providing this. It maintains that it is a content provider only and has always depended on hardware manufacturers to get this content into homes. Nor does it expect the new service to take viewers away from their terrestrial service, but rather it will simply make programming more accessible to consumers.

Adele Dyer

p34 ➢

Psion oils Windows for the Series 5

Psion has made the Series 5 more Windows friendly with a new version of its PC docking software. PsiWin 2.1 now includes converters and synchronisers for Office 97, Outlook and Corel WordPerfect Suite 8, and contact database synchronisers for Schedule+, Outlook and Lotus Organizer. Upgrades from earlier versions of PsiWin can be downloaded free (www.psion.com)

Psion has also released MacConnect, which links the Series 5 to work with Macs. Psion plans to provide access to Lotus Notes and Novell Groupwise from the Series 5. The first plug-in, In*Sync*, synchronises Psion apps with the Notes Calendar and Address Book. Notes database and email facilities will follow this year.

New Pilot flies with infra-red

3Com has announced the latest in its line of Palm Pilots. The new model is slightly smaller and lighter, with a more rounded styling, and for the first time has a removable flip-up lid.

It supports infra-red both for synchronising with a PC and for beaming files to another Palm III.

The HotSync link has been improved, so you can update information over intranets or the internet, or download files from a PC .

RAM has been increased to 2Mb to fit on more of the apps that are being created for the platform. It has sound for the first time and an enhanced screen giving you a choice of four fonts.

Email functionality has been extended with a Notes client in development. Old Pilots can be given the IR functionality, the increased memory, the lid and the new software.

To upgrade the hardware, you simply replace a card at the back of the Pilot. The upgrade price is expected to be under £150 (incl VAT), while the full version has a suggested street price of £299 (incl VAT).

Street prices for the professional and the personal

Pilots have been cut to an expected £229 and £169 (incl VAT) respectively.
3Com 0800 225252

Stand by for 3D TV and the robot that lets the dog out

Caroline Swift continues her reports from Silicon Fen

A band of Cambridge millionaires made the cover of *Business Week* recently. They included Roger Needham, director of Microsoft Research in Cambridge; Acorn founder Hermann Hauser; and Andy Hopper, director of the Olivetti and Oracle research lab. Not pictured was Stewart Lang, a co-founder of Micro Focus (first to put COBOL on a microchip).

He now has his sights on 3D TV with his firm Autonomy Stereoscopic Displays (formerly Auto Stereo Systems), an R&D house which licenses technology to US companies.

Lang, 49, who did a PhD in the university computer lab, has just moved his team to larger premises. They are working on a way of using a cathode-ray or LCD display to give an impression of depth by screening multiple images of a subject in very fast sequence.

A fast-switching LCD shutter dictates which image is visible to which eye and the view moves as you move your head. The image on a 2D changes 50 times a second to avoid flicker so an auto-stereo picture with, say, 16 views will need to refresh 800 times a second. Thorn has produced an LCD shutter with a switching speed below 100 microseconds.

ASD prototypes of these displays are getting larger: a 25in one is ready and a 50in is being developed. The focus is on games for now, but Lang does not rule out using advanced 3D viewing for electronic shopping. He aims to develop one version for portability and size and the other for quality: high resolution and more realism.

"The challenge is to make it into a product that appeals at a cost that appeals. All volume is related to finding an industry which will bootstrap it — it can't be introduced overnight."

Lang sees the US games market with its predilection for theme parks as one avenue.

ASD (01223 509905) is one of only a handful of players in the world working on 3D TV. Other pioneers, Cambridge Display Technology and Screen Technology, are nearby.
www.cl.cam.ac.uk/Research/Rainbow/projects/asd/brochure.html

Symbionics, a little-heralded success story, will stay in the fens after being bought by US-based Cadence Design Systems. The company develops wireless, multimedia and digital TV technology and has built a team of 150, doing work for the likes of Ericsson, Panasonic, Sony, Samsung and HP.

It has just completed an important contract for a GSM radio module for Matsushita Components. It has designed cellular phones, PC network cards, set-top boxes and PDAs.

Last year, it developed the most advanced Digital Enhanced Cordless Telecommunications (DECT)-compliant chipset and embedded software for wireless handsets and PBX systems. It has emerged as a leader in digital TV design.

Simbionics (01223 421025) is also on the group working on an open specification (Shared Wireless Access Protocol, or SWAP) to allow home PCs, phones and appliances to interoperate using wireless links.

The new standard, to be published this year, will let data and voice arriving by phone and/or digital TV be distributed in the home. It will enable devices to be controlled remotely, setting heating, security systems and turning the oven on.

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Short stories

Maxtor speeds in with a £399 11.5Gb drive

■ Maxtor leapt from the starting gates in April with one of the largest and fastest 3.5in EIDE / UltraDMA hard drives available. The DiamondMax 2880 stores an astonishing 11.5Gb and has an average seek time of 9.0ms.

Because of the limitations of BIOS and operating systems, many PCs are unable to use hard drives with more than 8.4Gb. Maxtor's MaxBlast installation software, however, will allow most PCs to use the 11.5Gb DiamondMax drive.

Maxtor says its Diamond Max 2880 range starts at £149 (incl VAT) for 2.88Gb and rises to £399 for the 11.5Gb model. The price includes the drive, fixing kit, software and installation guide.

Maxtor Europe 01483 747356
www.maxtor.com

Sure thing from HP

■ HP's latest rewritable, the SureStore CD-Writer Plus 7200, comes with software from Adobe, Symantec, and Corel. It reads at a 6x transfer speed and writes at a 2x transfer speed. The internal 7200i lists at £325, while the external 7200e is £399.

HP 0990 474 747, www.hp.com

16Gb Travan tapes

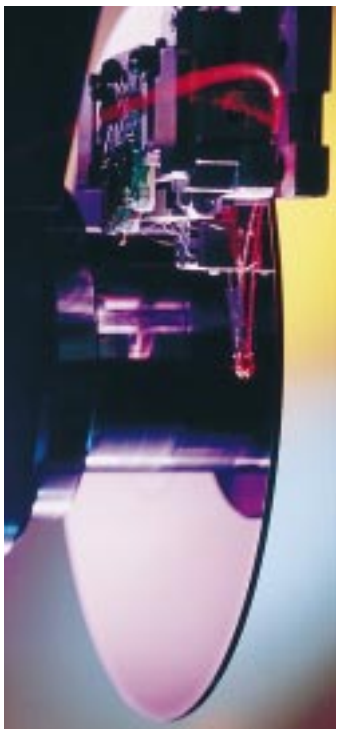
■ Imation has launched a new range of minicartridges for network servers. The Travan NS8 offers 8Gb compressed storage capacity. The MLR 16/32Gb holds 16Gb uncompressed. Prices start below £30.

Fibrechannel card

■ Adaptec has launched two PCI to Fibre Channel cards, the 32-bit AHA-F940 and the 64-bit AHA-F950 (*below*). The company believes FC will link next-generation storage devices because it can deliver 100Mb/sec up to 30m via copper, or 10Km via fibre. Up to 125 devices can be daisy-chained and hot-plugged using a hub.

Adaptec www.adaptec.com

Hang on a MO...Seagate pushes hard disks past magnetic barrier



Inside an OAW drive — note the optical fibre. MO drives normally use an open beam

Storage specialist Seagate has released details of a technology which it claims breaks through the "super paramagnetic limit" of data you can pack on a hard disk.

Data densities, which have been growing by 60 percent a year, are expected to tail off between 20 and 40Gb per square inch due to factors like media granularity.

Seagate has bought a company called Quinta, which has wedded magneto-optical technology to the Winchester hard-drive to enable data densities of 250Gb/in^2 and beyond. The system uses Winchester disk sizes and spacing, and a similar flying head. A hair-thin fibre takes laser light to a micromirror-and-lens assembly which melts a tiny pit of material. This melt, not the surrounding solid, is then magnetised by a coil. The mirror is moved for fine positioning. The arrangement has advantages over a standard Winchester head. The head can be ten times further away from the disk, making it more tolerant of uneven surfaces. This means cheaper plastic substrate can be used. Data density can be higher because coding is vertical rather than horizontal. The magnetic domains are pits rather than splodges.

Quinta marketing manager Philip Montero said products will be announced late this year but the first are unlikely to have high-data densities. He admitted that what Seagate calls "Optically Assisted Winchester" drives are a form of MO drive. "We didn't call it an MO drive because MO is [seen] as not performing well."

Seagate 01628 890366

Superfloppy drive gets cheaper

■ The price of the SuperDisk, formerly known as the LS-120 superfloppy, is getting closer to that of a standard floppy.

Nexus has launched an upgrade pack including Norton Utilities and Norton Antivirus for just £84.95 (ex VAT).

The drive is bootable and can read and write both 1.44Mb and 720Kb floppies as well as its own 120Mb disks, making it a viable replacement for a standard floppy. This is especially so in new systems because, unlike with the rival Zip, you do not have to pay for a floppy drive as well.

The SuperDisk could until recently achieve full capacity only in a new PC. But new 32-bit drivers for Windows 95 means the upgrade version performs to spec.

Both the SuperDisk and the Zip are available in notebook formats. But both face competition from a 200Mb floppy-compatible drive announced last year by Sony, which has yet to ship.

Nexus 01491 413 663
www.nexusp.com;
www.superdisk.com.

Iomega has launched the 2Gb version of its Jaz drive in the UK, claiming it is 40 percent faster than the 1Gb original, with a claimed maximum sustained transfer rate of 8.7Mbps. It costs a recommended £449 for the internal version and £519 for the external. A single disk goes for £149, and a three-pack for £349.

The new drive also supports the 1Gb disks of the older Jaz, the price of which has been cut by £20 to £249 internal and £269 external. Compare these prices with those of the Syquest SparQ reviewed on page 153.

Norton Utilities for Windows 95, available for £89, now includes a disaster recovery module for Iomega's Zip.

Iomega: 0700 046 6342; www.iomega.com

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Next-generation chip will give Java legs

Hewlett-Packard (HP) is to port Java to the Merced chip it is developing with Intel as the next-generation 64-bit processor.

The news came as Java developer Sun had a minor setback in its battle over Microsoft's implementation of the portable language.

A California judge refused to grant a temporary injunction to stop Microsoft calling its products Java "compatible".

Sun complains that Microsoft's implementation includes Windows-specific calls which destroy Java's universality. A full hearing is expected early this month.

A move to faster platforms like Merced will remove a major drawback of Java — the fact that its portable applets are slowed by the need to interpret or compile Java code.

First Merced systems are likely to be servers delivering Java applications to desktops. But John Saw, Hewlett-Packard's technical and architecture manager, believes Merced will end up on desktops.

HP is working with software vendors to ensure that applications are available when Merced (also called IA 64) ships next year.

An HP survey of 400 business and government delegates at Java seminars found that seven out of ten were interested in its ability to run the same code on widely differing machines. Eight in ten were interested in using it on the web.

HP internet product marketing manager Jolanta Polecka said she believed the next year would be make or break for Java. "Once the applications arrive and it overcomes the traditional criticisms of speed and reliability, Java will come of age."

● *Rival for Java — see p40*

Java received another boost last month when IBM's chip division announced that it is licensing Sun's "hardwired Java" — the picoJava I processor core.

IBM Microelectronics will be able to build custom chips around the core to accelerate the processing of Java applets downloaded to appliances such as games modules, PDAs and set-top boxes.

New Microsoft Office for small firms goes a bundle on desktop publishing

■ Microsoft has sold more than 20 million copies of Office 97 in less than a year, the company claims. Version 2.0 of its small-business edition is on sale this month with a canny bundle of applications including Word Excel, AutoRoute Express 98 and Outlook 97, plus a free upgrade to Outlook 98.

The £475 bundle (inc VAT), or just £195 to users of any Microsoft office product or selected rivals, includes templates for importing data from UK accounts packages and doing tasks such as debt tracking. It also has the latest Publisher 98, launched last month for £99 (inc VAT) standalone (£50 to upgraders).

David Bennie, desktop apps marketing manager, said small firms are increasingly designing brochures and other literature themselves. Publisher 98 includes a template

library which enables anyone to produce professional-looking documents (*above*).

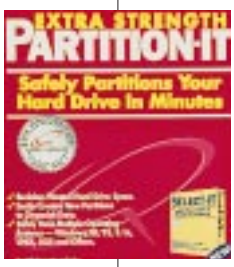
Bennie said Outlook 98 has been speeded up a lot. Also, a shared calendar can be viewed (although not amended) across a network: 97 users could do this only by installing Express server.

Microsoft 0345 002000

Short stories

■ Scan2CAD claims to be the first budget-priced (£69 ex VAT) utility to convert scanned images into accurate vector (DXF) files for use in CAD programs,
Softcover 0171 259 2100

Partition extra



■ The latest version of Partition-It Extra Strength, priced at £50, contains advanced boot manager technology allowing multiple operating systems to inhabit the same hard disk drive. Quarterdeck claims that the software's more efficient data storage techniques can reclaim up to 40 percent of wasted hard disk space.
Quarterdeck 00 800 7212 7212;
www.quarterdeck.com

Green grow the rushes to save the planet...

■ Demand for a software package that gives your home

an "environmental health check" is growing, says the Going for Green campaign.

Its CD, EcoCal, measures how "green" your lifestyle is and then gives hints on how you can help preserve resources. The first run of the £2 CD sold out in less than five months.
Going for Green 0161 272 5221
www.gfg.iclnet.co.uk

...or save your screen

■ Non-programmers are said to be able to produce spectacular multimedia screensavers using the new £30 Screen Saver Studio from Guildsoft.
Guildsoft 01752 895100

p40 ➢

Magic genes

The Turing-inspired Gene Machine promises tiny programs that could kill off the operating system and challenge Java as a global platform. Clive Akass reports.

Software has inspired more hare-brained wheezes than the perpetual motion machine, so startling claims made of an emerging technology called the Genetix Gene Machine might be viewed with a certain scepticism.

Developer Bernard Hodson, a British-born Canadian, says it could cut applications to a fraction of their current size, do away with the operating system, have the portability of Java and change software development largely into a matter of specifying what a program should do. Yet Hodson is no crackbrain: an adjunct professor of the University of Ottawa, he has been working in computing since its earliest days. He studied at Manchester University under Audrey Bates, who worked with IT founding father Alan Turing at Bletchley Park during the war.

Alan Turing, who committed suicide in 1954 — Hodson says previous attempts to create a Turing machine failed because they concentrated on his most famous 1936 work. In fact, Turing did some post-war work on how to implement the machine

Now the Gene Machine, from Hodson's company Genetix, has been endorsed by UK analyst Robin Bloor, although he is careful to point out that many of its promises have yet to be fulfilled. Hodson says his Gene Machine is based on the original Universal Turing Machine, described by Turing in 1936 as part of a formal proof that there is no process by which all mathematical questions are decidable. Turing had no concept of disks, working memory or application programs. He envisaged an infinite tape carrying symbols operated on by a read-write machine with a finite number of "states of mind": a symbol X read by the machine in state Y pointed to a rule (stored on tape) which dictated what the machine did next.

This abstraction was the first description of a generic computer. Today's machines use the more immediately practical model devised by John van Neumann. But Hodson, who in his early days perforce approached programming from first principles, returned on his retirement to Turing's model which he claims produces far more efficient software.

He replaced the paper-tape rules by an array of pointers to a library of operations fundamental to all classes of software. As these could be strung together to form complex operations, he called them genes. A gene consists of only a few bytes holding either calls to other genes, or Virtual Machine instructions typically translating to a few bytes of machine code. A gene can also call itself recursively. In addition, the Gene Machine needs only a tiny program of less than 2Kb which is called by an application to run a required sequence of genes: that is, the application runs the gene machine rather than the other way around.

Oddly, a growth in the number of genes does not result in a commensurate increase in library size: 400 genes occupied 24Kb, yet all 600 in the prototype occupied only 2Kb more. This is because the more of the genes there are, the more can be reused by other genes. One layer is hidden and immutable but custom genes may be added to an exposed layer.

Clearly the design of these base genes is crucial to the Gene Machine's efficiency. But Bloor, whose office is coincidentally virtually next door to Bletchley Park, says no other architecture has come close to its level of software reuse. The current Gene Machine uses an operating system but it can dispense with one if it uses drivers. The Genetix Virtual Machine, which translates VM code into local machine code, can be easily adapted for different platforms making it a rival for Java, Bloor says. He believes it can also be easily hardwired into a custom processor and can also be easily adapted to parallel processing.

Early applications are likely to be in embedded systems and the system is being assessed by the US Department of Defense and Cern particle-physics lab.

Hodson claims to have silenced critics who liken the Gene Machine to the Forth programming language. I cannot claim to have penetrated the subtleties enough to judge the technology, but Bloor, who spent months studying it concludes: "In our opinion, the Genetix Turing Machine is the most significant development in computing since the invention of the compiler "...it is still immature... and some time will elapse before it makes a visible impact on the computer industry. However, if it is allowed to mature we expect it to become dominant in the embedded processor market, to supersede Java and eventually become the primary means by which software is developed."

Genetix should not be confused with genetic algorithms, which BT's Dr Chris Winter predicted would revolutionise software over the next decade (*see Newsprint* May '97).

● Robin Bloor's report, *The Gene Machine: an analysis of a Universal Turing Machine*, costs £95 from Bloor Research, Challenge House, Sherwood Drive, Bletchley MK3 6DP.

Bloor Research 01908 373311; www.bloor.co.uk ■

MSN discontented

MSN is getting out of the home grown content business. The company stopped producing the last of its unique programming at the end of March, saying, "We no longer need to be in the position of doing everything ourselves."

The provider will still offer "best of breed lifestyle content" but from outside partnerships such as Disney and *Private Eye*.

Cinemania Online and Music Central will also get the chop in December.

In its heyday, MSN offered 30 shows based on a TV-season model, but half of its offerings had already been cancelled last February. Oliver Roll, MSN's group marketing manager, says: "What we learnt is that consumers are not yet ready to veg-out in front of their PC. They use the internet to get information and take advantage of services."

Access to all parts of www.msn.co.uk, which will likely be rebranded as Start.com later in the year, is now free.

MSN says that it still offers added value for its members via its subscription service. "A lot of consumers still want a complete, integrated, service that includes access, email, content and community," says Rolls. "But we don't really mind where people get their net connection. It's just a commodity. We want to focus on reaching the broadest set of online users possible."

Susan Pederson

Potential for TM: nice but dim

■ NetNames is warning companies that if they don't snap up the latest top-level domain name, they may find that others have got there before them.

The global domain name registry says it has received applications for over 1,000 .tm domain names: the most ever recorded by a top-level domain in its first week of operation.

The domain name of Turkmenistan (a republic of Central Asia), .tm, is seen as an alternative to .com and will be used by companies to indicate trademark. Safeway, British Telecom and British Petroleum were among the first to register via NetName's automated online system.

NetNames says that some companies do not yet realise the potential of .tm. "We are trying to help those companies by holding back some names similar to famous trademarks…" says domain name manager Mark Henderson-Thynne.

Susan Pederson

NetNames 0800 269049; www.netnames.co.uk

● See also, p289.

Out of site, out of mind

■ A co-operative of web site developers and managers says it can help small firms to find a one-stop solution for their internet service needs. Web-Sights' company listings include design, development and marketing. It is a free scheme but members must provide links to at least two web sites they have created.

Web-Sights 01788 330054; www.web-sights.co.uk

The Tate Turners to the web

■ **The Tate Gallery is inviting visitors to take in a Turner, online. The world-famous London gallery hopes to attract new visitors by promoting itself on the web at www.tate.org.uk/. The best part of the site is the online catalogue, which will eventually list the gallery's 25,000 artworks. Gallery shop addicts will also be delighted with its mail order service.**

Internet shorts

The big web store

■ Having signed up its 100th UK vendor, Atlantic Coast is claiming to be the largest software web store in the world. The Atlantic Coast Soft Shop's "pay and download" web site offers over 12,000 applications, most of which can be downloaded after users have made a secure credit card payment.

Atlantic Coast 01297 552 222; www.soft-shop.com

■ Find out what all the fuss is about at the Millennium Commission web site. All the news is here, as well as a comprehensive map of UK millennial projects. It also tells you how to get its quarterly newsletter and to whom you should write about that big baby.

www.millennium.gov.uk

Tomorrow's skills

■ Learning HTML might be a shrewd career move according to online help specialist, Digitext, which claims that demand for people with HTML skills will far outstrip supply in 1998. Digitext also claims that 79 percent of software developers plan to implement HTML-based help by the end of this year.

Digitext 01844 214 690; www.digitext.co.uk

Risk to corporate sites

■ Almost half of all UK corporate email sites use software with known security risks, according to security specialist NTA Monitor. Most of these sites use old versions of software which allow hackers to access and change file information.

www.nta-monitor.com

Web-it-yourself PC

■ Gateway's web site has been redesigned to focus on build-to-order sales and technical support. Customers can now configure and purchase their PC online and consult technical support forums.

www.gateway2000.co.uk

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Internet shorts

Unique to Unix

■ Microsoft has released its first browser for UNIX users. IE4 for Sun Solaris 2.5 has unique features, including Explorer bars and Security Zones, and was designed specifically for the UNIX platform.
Microsoft 0345 002000;
www.microsoft.com/ie/ie40

Suzi cutey

■ The fun and fast Suzuki Wagon R+ web site lets you customise your own car with your choice of colours and extras and then take it on an interactive tour.
www.wagonr.co.uk

■ The *Evening Standard* is relying on internet mapping software from ESRI (UK) to produce hundreds of real-time maps on the comprehensive London guide at www.thisislondon.com. Although ESRI came up with GIS (Geographical Information Systems) software in the late sixties, the technology had few applications until the birth of the net. ESRI is at www.esriuk.com.

Eye on the market

■ Private investor specialist DataStream/ICV has added an interactive bulletin board, online shopping facility and UK broker services links to its Market-Eye Internet Service.
www.market-eye.co.uk

EC goes for more regulation on the net

ISPs should not be held accountable for their users' actions, according to a senior European Commission official. At Internet Service Provision '98, advisor Patrick Vittet-Phillipe said ISPs must be protected from people who break the law while using their networks: "Providing internet access is not the same as publishing," he said.

The EC has already announced plans to adopt voluntary codes of conduct for European ISPs and online publishers in an effort to restrict access to online pornography and hate sites. It will encourage ISPs to use content rating and filtering systems and will also set up hotlines where users can complain about offensive content.

The EC has also expressed its concern that Europe is being frozen out of proposals for changes to the internet. In a statement, it said that the US Government's January green paper ignored the need for international regulation and disregarded recommendations from the Geneva-based Council of Registrars. It has urged member countries to join its response and force the US to get more international views on its proposals.

Susan Pederson
(additional reporting by VNU Newswire)

A plug for recycling

■ **An office spring-clean invariably produces a huge pile of outdated, unloved, electrical equipment destined for the landfill. The Industry Council for Electronic Equipment Recycling has produced a free online guide to reducing the one million tonnes of equipment we throw away every year. It's called The ICER Directory of Electronics Recyclers and currently lists 30 UK recycling companies. It is available at www.icer.org.uk. Hard copies are available for £25 each, from ICER, 6 Bath Place, Rivington Street, London EC2A 3JE.**

ICX group is for secure Euro e-commerce

■ A user group dedicated to overcoming technical and psychological resistance to e-commerce says that the medium's progress is being hampered by the practical concerns of European organisations.

The International Commerce eXchange (ICX), the first user group for secure e-commerce in Europe, was launched in February with funding from the EC and endorsement from the DTI.

Chris Taper, ICX treasurer and ICL's principal consultant on electronic commerce and security, said, "We must work to overcome the security, technical, legal and regulatory blockages to business, enabling efficient and cost-effective secure electronic trading."

The group, which will provide advice to member organisations, will be the European authority on e-commerce issues.

If your organisation would like to become a member of ICX, you should contact John Crow on 01480 355035.
www.icx.org

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Tighter technology

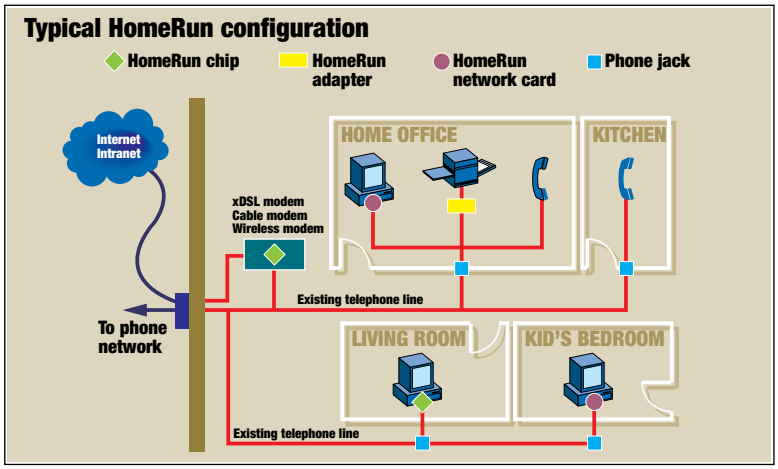
■ **MIMEsweeper 3.2, a security tool for Microsoft Exchange users, has been launched by Integralis Technology. MIMEsweeper can block junk email and spot "spoofers" (senders masquerading as other users), as well as allowing organisations to block URLs to control web-surfing by their employees.**
0118 9306060; www.mimesweeper.com

It's showtime

Tim Bajarin reports on some hot products and interesting developments to come out of Internet Showcase, including better uses for home wiring networks.

One of the more interesting US conferences is David Coursey's Internet Showcase. IT pundit Coursey, who runs a newsletter at Coursey .com, takes a sceptical view and people take notice when he sees something worth talking about.

Coursey uses Showcase to feature hot products he has reviewed during the year. Of this year's products, two struck me as important. Both were in the home-network category and had a similar goal: to allow people to use their existing wiring for either net access or appliance control.



As well as enabling net access from any room in the house, Home Run could also be used to connect digital appliances in the home

Home Run, from Tut Systems <www.tutsys.com>, delivers net access throughout the home by using existing phone wiring. Tut is betting that xDSL technology will take off soon, so Home Run modems and adapters will access the net from any room. These modems could also serve as the backbone for a home network that would connect any digital appliance over xDSL lines. DSL technology got quite a boost last week when Microsoft, Intel and Compaq decided to back a standard put forward by five of the "Baby Bell" major US telephone companies. A competing standard is being pushed by Lucent Technologies, but one version should hit the market early next year.

DSL provides speeds of up to 1.3Mbps over phone lines, even when they are being used for voice calls. A competing modem from Intelogis <www.intelogis.com> connects to any power plug to transmit an FM signal of data or instructions to other modems that might be connected to a printer, fax, or PC. It creates an inexpensive way for digital appliances to communicate.

A Silicon Valley company, called Digital Interiors, is installing high-speed ISDN or T1 network access in the homes of big spenders. But products like those from Tut Systems and Intelogis should give others high-speed access and home networking at a fraction of the cost.

Another showcased product was from EnCanto Networks <www.encanto.com>. The e.GO Merchant Server, a kind of an online shop in a box, sells for $1,295 and enables you to sell products online by following simple instructions. It has all the software needed to create and manage an online business and should be a hit at the price.

The Internet Research Assistant (IRA), from the Aeneid Corporation <www.aeneid.com>, has serious ramifications for people needing to search for information on the web. It provides a unique framework for collecting and analysing information, discovering insight and formatting conclusions. It initially targets the high technology and financial services industries. What sets it apart is that it organises and delivers data. Using tear sheets, IRA compiles topical groupings of available information (such as financial tables, product descriptions and business backgrounds) in the best example of narrow-cast searching I have seen. At the time of writing, the new search service was due to go online in March and should become a hot tool for all types of business use.

An interesting twist at this year's Showcase was the lack of push technology (last year's served as an important launch-pad for Marimba) . But it has become clear that in many cases, the technology was overrated; more important, many users have found it intrusive and have asked managers to send only information critical to their jobs. The problem has been exacerbated by spamming which has clogged postboxes with unwanted ads, causing bad feeling which has spilled on to push technologies. Now a concept called "intelligent push" is emerging to give users much more control over what they receive.

Speakers at the Showcase suggested that companies use everything from animated ads and incentives to get users to request information feeds. This is already working on sites like My Yahoo! and My Excite where users can set up what is sent to them, although they still have to endure banner ads, of course.

Indeed, one of the most important conclusions drawn from the Showcase sessions was that ads will continue to finance free sites. Some subscription services will continue but the web is being viewed as just another broadcast medium where advertising plays a major role. ■

p47 ➢

Survey puts future of ActiveX in doubt

Microsoft's ActiveX has no future as a significant web development tool, according to three-quarters of webmasters.

A poll conducted by US online service C-Net found that 72 percent of respondents (including net end-users, web developers, webmasters and other specialists) believe that ActiveX has "no future as a web development tool".

The problems with ActiveX appear to be poor security, slowness and lack of openness, according to the survey. Many respondents believe that ActiveX was doomed by its dependence on Windows, which limits functionality for developers as well as cross-platform support.

Microsoft has since stated that "ActiveX has a role in our overall strategy for web development", but it is noticeable that all of its recent distributed computing announcements have centred on components and the Common Object Model (Com) rather than ActiveX.

Caroline Gabriel, VNU Newswire

New millenium means free BT email for all

■ British Telecom is giving everyone in the UK a free web-based email address to mark the new millennium.

Like Hotmail, users will be able to access their Mill-e-mail account from any web-accessible computer in the world. BT says the service will be paid for with "carefully controlled sponsorship and advertising". Rupert Gavin, md of BT's consumer division, said, "We believe that by 2000, this new service will make sending and receiving electronic mail [as much] a part of everyday life as posting a letter." Mill-e-mail, now being piloted, will be fully available later in the year.
www.bt.com

UK Top Ten web sites

Private Eye heads up the latest list of top new sites from Yell <www.yell.co.uk>. There's been no further word on the impact of the organ's "allegedly lucrative" sponsorship deal with MSN but animation and sound has made a mysteriously sudden appearance. It still looks better with Netscape, though.

1. Private Eye	http://privateeye.uk.msn.com
2. Maxim	www.maxim-magazine.co.uk
3. Dr.Martens	www.drmartens.com
4. The Site	www.thesite.org.uk
5. Vexed Generation Clothing	www.vexed.co.uk
6. The Tate Gallery	www.tate.org.uk
7. New Deal	www.newdeal.gov.uk
8. Dynamik Music	www.dynamik-music.com
9. Blue Note Records	www.bluenote.com
10. Double Decker	www.doubledecker.com/flash.htm

Internet shorts

■ Get in on the "cool Britannia" vibe and spend May's embarrassment of bank holiday riches in your own back yard. The British Tourist Authority has relaunched its web site, to public acclaim and industry accolades. In fact it's so comprehensive it does practically everything but drive you there itself.
www.visitbritain.com

Girls on top

■ Young men don't dominate the net, according to the Women's National Commission. It says that 40 percent of web users are women, and their average age is 35.
www.thewnc.org.uk

Better safe than sorry

■ Adept Scientific says that the millennium bug will have little impact on its scientific and technical customers, but has nevertheless added a year 2000 area to its web page.
www.adeptscience.co.uk/as/year2000

Small shops on web

■ Small-to-medium enterprises can move their business onto the web for as little as £199 (ex VAT) with The Floyd Consultancy's *Shop*@ssistant. The off-the-shelf package gives users a "blank" site and extensive tutorial. A variety of cash and credit/debit card options are provided via a secure server connection to specialist merchant services provider NetBanx for a further £300.
The Floyd Consultancy
01256 880770;
www.floyd.co.uk

p50 ➢

Don't rain on my domain

The case of the man who fought BP on a bogus web site, and won, highlights the importance of protecting company domain names. Ken Young comments.

British Petroleum (BP) has agreed to compensate a man form Exeter who claims his car was so damaged in a BP carwash that it was unroadworthy. Nothing unusual there perhaps, except that the man fought a nine-month long battle for compensation. BP finally paid up when he championed his cause on a bogus web site which used the address www.britishpetroleum.co.uk.

It's the real thing — BP's official web site

Many legal advisors believe that BP had a fair case against the man for slander and copyright infringement. The fact that BP settled out of court suggests that using the net to get your complaint across is, for the moment at least, an effective means of direct action.

The man in question, John Budd, a freelance computer engineer, said it was his only recourse after alleged damage to his car occurred, costing about £450. "It happened last summer. The manager of the service station didn't want to know and neither did BP. They referred it to the company's insurers Commercial Union which decided that BP was not liable."

Instead of leaving it at that, in September last year Budd informed BP that he was applying for the aforementioned domain name. He received no response and proceeded to create his protest web site by copying the home page from www.bp.com and providing his own links to pages detailing his view of events and even including numerous photographs of his damaged car.

BP was far from happy when the story of the bogus web site appeared with a photograph on the front page of *The Times* newspaper. It contacted the domain name authority Nominet which, in turn, contacted Budd's service provider, which put the domain name on hold, effectively banning the site. Budd was warned by BP that legal action against him may follow but instead BP offered Budd £1,000. Budd held out for more compensation, refusing to accept the offer.

After two weeks Budd heard that he was to get the use of the domain name back because BP had decided not to take legal action.

While he was planning for a relaunch which, he said, "would include lots of details about how BP is damaging the environment", BP made a renewed offer, closer to his original claim. Budd accepted, claiming victory in his online war against the company. "The internet gives us all a chance to speak up against such injustices. This is a great new opportunity," he said.

Companies like BP face tough choices in the face of such online protests. The only protection they can make in advance is to register all possible uses of their company name in a web address. Domain companies charge about £10,000 to do this but to register permutations of the name means that figure is multiplied by a factor of three or four. A careful company could spend £40,000 just to stop bogus sites from being created — cheaper than possible legal costs but unlikely to stop the more ingenious cyber protestor who will always be able to come up with a similar-sounding domain name to that of the company.

Although a recent legal case went in favour of companies who wanted to stop two individuals from collecting domain names similar to their own, the case has now gone to appeal. It is likely to be some time before companies can effectively protect themselves from such action.

■ *Ken Young edits an online newsletter at* www.newsnow.co.uk

Can small ISPs resist the charm of Microsoft?

Small Internet Service Providers will struggle to survive this year unless they diversify, according to research carried out by Microsoft. It found that of 2,000 companies which claim to sell access and site hosting, only 300 are the original source of such services.

Microsoft claimed that many electronic commerce services on offer were half-baked. "Nearly half our sample claimed to offer electronic commerce but we often found that they did not have the products to do so," said Andrew Pickup, Marketing Manager of Microsoft's Internet Customer Unit.

Not surprisingly, Microsoft believes it has the answer and is inviting small ISPs to join its support programme called the Internet Service Network.

Netscape agrees with the findings but not with the cure: "Small ISPs will struggle as the larger ISPs offer more 'value-add' but Microsoft products are not the answer; they are just not scaleable," said Dushan Rinic, Netscape's product marketing expert.

The wreckers roll out

Wreckin' Crew is the latest new game from Telstar. Due to be launched at the beginning of May, this game is a chaotic multi-player race through the streets of New York and Sydney.

It has comical weaponry, including chickens and pigs to throw at each other, a "vicious" rottweiller snapping from a car window, and "acid flask" attacks. Watch out for more details in next month's edition of *Screenplay*.

New mission

A new Hexen II Mission pack entitled Portal of Praevus is soon to be released. This latest add-on returns players to Blackmarsh to investigate the endless winter that has befallen the world. Gaming starts from inside Eidolon's Castle and players have to bludgeon their way through 15 new levels brimming with malicious monsters. Visit www.activision.com.

BMG Interactive

Amongst BMG Interactive games, due out soon, isTanktics. This is a 3D polygon landscape strategy game with quirky humour where the player has to construct tanks and use them to defend, attack and capture other players' flags.

Then there is Monkey Hero, a Japanese-type cartoon game where the player has to crack puzzles and defeat powerful enemies.

In Special Ops, the player becomes a member of the US Special Forces and must complete missions such as hostage rescues and counter-terrorist attacks.

State of Play
Games news by Etelka Clark

Kids online

Mega Mirror, the kids' games section from Saturday's *Daily Mirror*, is now online. Readers can post their own reviews on the net, take part in the Swap Shop and gain access to lists of tips and cheats for all the biggest computer games. Go to www.mirror.co.uk.

Flight sim fun

Amongst the recent launches of flight-simulation games, Nova Logic's F-22 Raptor is different; you don't have to go out and buy it. You can play a beta version on the net and engage in free combat with up to 100 players. Visit www.novalogic.com.

■ *Don't forget to take a look at* Screenplay *this month (p372). Our reviews include Douglas Adams' new game, Starship Titanic; Nightmare Creatures; TOCA Touring Championship; and Monty Python's Meaning Of Life.*

Telstar's new game, Wreckin' Crew, is due for release in May

Top ten PC Games		Publisher
1	Grand Theft Auto	BMG
2	FIFA: Road to the World Cup '98	EA
3	Championship Manager 2 97/98	Eidos
4	Tomb Raider 2	Eidos
5	Quake 2	GT Interactive
6	Virtual Springfield	EA
7	TOCA Touring Car Championship	Codemasters
8	Age Of Empires	Microsoft
9	Carmageddon	Sci
10	Duke Nukem: Kixx	Eidos

Top 10 Windows software

			Last month
1	MS Win95 U/G + IE 4	Microsoft	1
2	MS Office 97 C/V U/G MLP	Microsoft	-
3	Corporate only - MLP U/G	Edge	-
4	MS Office Pro 97 + Books U/G	Microsoft	3
5	MS Encarta Deluxe 98 CD	Microsoft	4
6	Paintshop Pro v4.14 95 CD Digwork	Digwork	9
7	Nuts + Bolts (3.1 + 95) Xatlantic	XAtantic	5
8	MS OfficePro 97 C/V MLP	Microsoft	-
9	MS Office 97 Stand V/comp	Microsoft	6
10	MS Frontpage 98 FP CD	Microsoft	2

Top 10 DOS software

1	System Commander v3.0	POW	3
2	DOS 2 Win95 U/G with Internet	Microsoft	2
3	MS WFWG 3.11 Base	Microsoft	-
4	MS DOS v6.22 U/G	Microsoft	4
5	Corel WP 6.2 U/G	Corel	5
6	Procom for DOS	Datastorm	-
7	MS Mail PC Remote 3.2	Microsoft	-
8	Novell Personal Netware	Novell	-
9	Turbo Pascal v 7.0	Borland	6
10	Turbo C++ v3.0	Borland	9

Top 10 CD-ROMs

			Last month
1	Babylon 5: Ultimate Reference Guide	Cendant	1
2	Encyclopedia Britannica	Acclaim	2
3	Encarta 98 Deluxe	Microsoft	6
4	Music File 98	File Productions	4
5	Star Trek Encyclopedia	Zablac	7
6	Mavis Beacon Teaches Typing	Mindscape	8
7	Uninstaller 4.5	Cybermedia	-
8	Encarta 98 Standard	Microsoft	10
9	James Bond: Ultimate Dossier	Eidos	-
10	Autoroute Express Europe 98	Microsoft	-

Top 10 Peripherals

1	Umax Astra 610p	Umax	1
2	USR Sportster Flash Ext	USR	2
3	HP ScanJet 5100C	Frontline	-
4	Umax Astra 610s	Umax	4
5	Umax Astra 1200S	Umax	-
6	USR Sportster Message +Ex	USR	-
7	MS Sidewinder Precision Pro	Microsoft	9
8	AWE64 Discovery 24x KIT	Creative	3
9	Evergreen 486/586 proc U/G	Evergreen	8
10	AWE 64 Gold	Creative	-

Sounding Off

Laptop man and mobile phone phreaks need their own eateries and train carriages. Michael Hewitt puts the case for technology-free public places.

Michael Hewitt

Diners at the plush Ivy restaurant, in West Street, London WC1, have one thing in common with those at a chimpanzees' tea party: most of them are there not so much to eat, as to be *seen* to eat.

Competition for the best, most visible tables is intense. Your worth as a human being is determined by how closely they seat you to the murals, to the right of the main entrance. Lesser beings are placed progressively further away until the lowliest end up in the Epicurean equivalent of the Seventh Circle of Hell, in the bar area at the back. But this is not necessarily eternal damnation. I'm told that with time, good behaviour and a better taste in ties, you can work your way out. So last week I was shocked to see a man recklessly condemn himself forever to the cheap seats.

He sat down, took out a laptop and, with no provocation whatsoever, started using it. I think my first reaction — one no doubt shared by other diners, too — was that I had somehow been violated. The Ivy is supposed to be an oasis of sophistication, an escape from the realities of workaday life. When you're eating chips (or *pommes allumettes*, as they like to call them there) that cost around 10p each, you don't want to be reminded that some sort of hard labour is going to be involved to pay for them.

But this guy was doing just that. What I should have done, of course, was simply order a waiter to go over and spill something on him. Too late, though. After a short while sitting there, staring, I began to suffer badly from the effects of passive word processing; my fingers twitching in time to his. Very soon, I was almost overcome by an urge to ftp something very large. If the shock of the arrival of my equally large bill hadn't taken my mind off it, I might well have gone into spasm.

I believe there's a case these days for designating certain places as technology-free zones, in much the same way as, say, mosques are designated Hush Puppy-free. If only because the point of modern technology — be it a mobile phone, a laptop computer, or one of those digital watches that beeps on the hour — seems to be to encroach on what used to be your "quality" time. Leastways, that's the case for those of us in the so-called white-collar professions. The blue-collar crowd wouldn't put up with it. Go down to a working man's pub, for instance, and you won't see a builder bringing his concrete mixer in, or a road-digger attempting pneumatic drilling while he waits for his pie and chips to arrive.

Great Western Railways made a step in this direction when it announced it is designating at least one carriage of its trains as a Mobile Phone Free Zone. Even if you take one in and attempt a furtive conversation, you won't be able to because the windows are lined with special shielding designed to block the best efforts of Messrs Cellnet and Vodaphone. The most you'll manage will be a loud crackle and the disapproval of fellow passengers.

Perhaps, though, this is approaching things from the wrong direction. If you are of my vintage you might recall that trains had a "Smoking Carriage" appended. It was so-called because it did and, once in, you could. There weren't any No Smoking carriages *per se*. It was accepted that, if you wanted a cigarette or a toke, you'd choose the carriage equipped for this sort of thing. It featured regularly-emptied ashtrays, matches and a rudimentary smoke extraction system. Maybe a similar approach should be taken, not just towards mobile phones, but technology of all descriptions.

When I'm on a train I like to read a book, sip a whisky and watch the world go by. Even if I did want to work, experience has taught me that I could not do so efficiently. Modern trains are not equipped to properly cope with laptops or mobile phones. The signal on the phones keeps cutting out (and, I'm told, can give you a medium-rare head with over-use), and the tables are neither big enough nor sufficiently vibration-free to allow me to type comfortably. But a Technology Carriage would have smooth suspension, power points for the laptops and a clean digital phone line, enabling both voice and internet communication. It would be a mobile office, where you could work yourself to a heart attack, and beyond.

Extend this idea to the West End of London. Currently, places like Rules or The Gay Hussar make useless offices. You keep getting sun-dried tomato or Bresaola in your laptop keyboard. But have, for instance, L'Escargot open up an internet café or Marco Pierre White take over the Cyberia franchise, so anyone who wants to pay upwards of £15 for a starter and show off his new laptop or beeper can do so, neither embarrassing himself nor irritating anyone else. There's obviously a pent-up demand for this sort of thing and, therefore, a fortune to be made. If I were not broke from that last session at The Ivy, I might well invest some money in this idea myself.

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Straight Talking

Why do installations try to take over your whole PC? Microsoft's IE is a prime culprit, and is also guilty of the current obsession with updating. Barry Fox reports.

Barry Fox

Microsoft gives Internet Explorer CDs away like bags of sweets. Putting the disc in a PC starts an automatic process with the safe choice of "standard installation". Then comes the Windows Desktop Update with "Yes" as the default option. There is no clear explanation of what this means, so most people will accept the default rather than risk defying it. From then on, installation just chugs away.

Once the process has finished, the unsuspecting PC owner finds that Internet Explorer has body-snatched the screen. It is black and dominated by coloured pictures which show the internet channels offered by the Microsoft Network. Understandably, some users panic or get angry. The explanation of how to put things back to where they were, is buried behind another command.

For anyone staring at a hijacked screen, the trick is to click on Start, then on Settings, then on Active Desktop and look for View as Web Page. The culprit is the tick against it. If you click on View as Web Page, the tick disappears. Wait a few seconds, and after some hectic hard-disk activity the screen should look normal again. Simple. But only when you know how.

Bill Gates sent the US Justice Department an open letter in response to the Government's complaint that IE4 is integrated with Windows 95. Having reassured them that "my goal has always been to create software that improves the quality of people's lives…[blah, blah]", Gates claims: "Removing the internet functions from Windows is not simple, as some might think. These features are integrated into the operating system and are used by applications, and directly by users. Removing them breaks the applications." This is just what Gates told a conference in Paris when the US Government was first chasing him. "We can't help it if our stuff works better with our stuff" was his justification for the tight links between Microsoft's applications and operating systems.

These "of necessity" excuses collapse when you look at the way Microsoft unnecessarily defaults IE4 to hijack a PC. And, it seems, Lotus plays a similar game. When I recently tried to load a speech synthesis program (Lernout & Hauspie's Madison*) the installation process threw up a string of stark choices. Madison had found read-only files and wanted to overwrite them. The only options were yes, no, or cancel, with no explanation of the risks.

Remember, when you overwrite a file it is gone forever. For a file to be marked "read-only" there has to be a good reason to protect it. So instead of crossing my fingers and hitting "yes" to overwrite, I played safe and clicked "no". Madison continued to install but when I came to run the program it refused, throwing up the error message that vital DLL files were missing. Lernout and Hauspie (L&H) admitted it had not spotted the problem until after the program discs had been released. A few Windows programs, particularly from Lotus, break Microsoft's guidance rules and mark files as "read only", and this makes software hard to uninstall. But it leaves other programs unable to overwrite shared files, particularly DLLs: I had ccMail, so fell victim to the competition between Lotus and Microsoft.

Even when I let Madison overwrite the Lotus files, it would not work. The error message read "No TTS engines" and advised that I "choose to install TTS engines" (whatever they are). A month after I had sent L&H screendumps of the errors, I've not heard back. So, stuff Madison.

Stuff Seagate, Adaptec and Philips, too. Philips bundles Seagate Backup and Adaptec control software with the CD-R recorder. Put the two programs together on a PC with compressed hard drive and you get a spectacular crash. None of the companies cares enough to come up with useful guidance. I see that Hewlett-Packard (HP) has dropped Seagate Backup from the bundle which comes with its badged version of the Philips recorder. From past experience of asking HP about anything more complicated than product price, I would not even bother to question HP's CD-R policy. The modern trend is for software to put the PC online and look for updates. The first batch will usually be free, while later ones are charged. Either way, we pay for phone time.

Internet Explorer and MSN software are champion updaters. No sooner have you loaded the latest disc, than the PC is online updating it. So here's some advice: be wary of internal modems. They can dial out without your knowing it. They may also fail to hang up and drop the line after an online session. With an external modem you can keep an eye out for telltale red lights and switch off the modem if the line stays open.

I once got a BT phone bill for five hours' long-distance connection to information service Tel-Me, when average access time was a few seconds. I only got BT's charge cancelled because I could declare diligence in always checking the modem LEDs after disconnection.

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Business Matters

The relationship between business and academia is often disastrous. If they were allied more closely, says Brian Clegg, then millions in EU cash could be saved.

Brian Clegg

Every now and then someone fairly important like the Prime Minister, or someone really important like Bill Gates, tells us what a wonderful thing it is for business and academia to work together: how the universities can benefit from exposure to the real world, and business can thrive on all that academic talent. It's a great concept, and there is a way to make it work, but often it's a disaster.

I have been involved in a number of European Union projects, intended to bring corporate business users, academics and IT companies together to do great things. Despite massive funding, pretty well all of them have faltered. I suppose the missing ingredient is pragmatism. The business people involved wanted to make compromises and get on with the application. The academics were determined to do everything their way. So, of course, the system had to run on a Unix box and be written in an obscure language. It didn't matter that all the potential users had Windows on the desktop; this was doing things properly. I have even seen proposals where the first stage was to build the computer, rather than accepting what was possible off-the-shelf.

A well-known example of this ability to put idealism in the way of practicality is the work of the computing division of Xerox. Everyone knows how the Palo Alto Research Center developed the GUI, only to have Apple and Microsoft make all the business running. I had some direct experience of this. In the mid-eighties I was running a special projects group in a large company. We had written some of the first UK Windows applications, despite the horrendous limitations of Windows 1.

We visited Xerox and were extremely impressed with its high-power graphical workstations. They looked at what we were doing and sniggered. "It's rubbish", they said. "Why don't you get rid of those toys and get real machines?" The answer was that we couldn't afford the Xerox solution and didn't want proprietary workstations. Those very clever Xerox people simply couldn't see that the world wasn't going to abandon PCs because Xerox workstations were technically better.

Let's face it, there is some truth in the "ivory towers" concept. Take a well-known academic featured in a TV documentary on psychic phenomena. He was the "voice of reason". After seeing various psychic superstars at work, he gave an argument as to why they were frauds. I paraphrase from memory, but the gist was that they must have been frauds and that if they had real psychic talents, they would have come forward for scientific study, rather than use their abilities in show business. Hmm… Let's look at that another way. You have amazing psychic abilities, so would you rather go into show business and earn millions of dollars, or become the subject of laboratory experiments and probably end up dissected by the US government? Difficult choice? Exactly which world does this person live in?

Let's take another example. I've just read *Darwin's Dangerous Idea*, by philosopher of science, Daniel Dennett. This is an excellent book on the implications of evolutionary theory. The author is painstakingly logical and step-by-step in his approach, yet half the fascination of the book is page after page of criticism of other academics (at times verging on the vitriolic) and the way that his logic goes out of the window when he hits a subject, like theology, that makes him uncomfortable.

Academics are human (easy to forget) yet, dare we say, a little removed from the real world. It is not surprising, then, that when business tries to go hand in glove with academia, it often fails. (Incidentally, "iron fist in a velvet glove" refers to two separate hands: the knight's in the armoured glove and the lady's in the velvet. It isn't at all the same as a wolf in sheep's clothing.)

It seems that the academic's need for rigour, even when criticising colleagues, is so strong that it makes pragmatism, the oil of business machinery, practically impossible. It's interesting that Dennett is a great proponent of artificial intelligence (AI) which has, with a few exceptions, proved almost useless in mainstream business computing. He is rightly excited at the prospects of AI, but does not mention that it cannot yet deliver.

All is not lost, though. The solution is not to try to turn academics into business people, or vice versa, but to set up a permeable pragmatism barrier. By all means fund academic research from business, but don't expect the academics to turn their ideas into real products.

Use the Xerox/Apple model. Give the academics plenty of cash and freedom, and in turn reap the good ideas but turn them into practical possibilities in the real world in a pragmatic, business-driven company. More of such symbiosis would benefit both sides and could prevent millions in EU cash from going down the drain.

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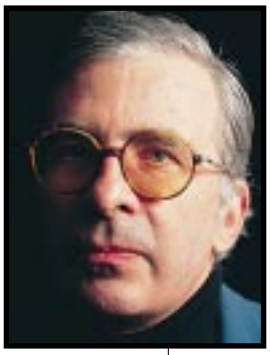

Tim Nott

From the desktop

For a man who no longer sees the funny side of computer jokes, the spoof "Microshaft Winblows 98" brought forth a chuckle or two. Plus, pop stars, princes and Monimals.

Computer jokes are all very well, with the exception that few, if any, are ever funny to the vast majority of the human race. My ten most dread turn-offs are:

1. Anything comparing operating systems with cars, aeroplanes or other forms of transport.
2. Anything containing the words "light bulb".
3. Anything involving assigning numbers to letters and then adding them up, or manipulating ASCII codes to produce so-called cabalistic numbers.
4. Anything that starts "To be sung to the tune of Bohemian Rhapsody…".
5. Anything that is in spoof programming code.
6. Anything in a "ten most…" format, such as this list.
7. Anything (in season or, for that matter, out) that starts "'Twas the night before Christmas…".
8. Anything whose punchline depends on Ada and Linda sharing the surname, Lovelace.
9. Anything involving key industry figures being admitted, or not, into heaven.
10. Anything with the name "Microsoft" in the first line.

So, when a copy of Microshaft Winblows 98 (A Parody On CD-ROM) landed on my desk, it was with some trepidation that I slid the CD into my drive. First, you are greeted by your hosts, in video. Power-dressed Meg is an assistant to an assistant to The Man Himself, and despite being under-appreciated, overworked and constrained by the glass ceiling, she is not bitter. Angry and vengeful perhaps, but not bitter. Graham, currently employed by The Company as a janitor, is a wannabe programmer who worships the ground Bill floats above.

There are a few conventionally amusing diversions, such as Pinbill, a space-invaders-style Exploder and your very own pet Billagotchi. Feed him bags of money, clean up his "releases" and smack his bottom from time to time and… well, you get the drift. The best game is Win Bill's Money, a quiz game rather in the style of You Don't Know Jack, where your distinctly ungenial host, Steve Jobs, makes bitter cracks about his rival and caustic remarks on your performance ("I've always preferred the stick to the carrot"). In all the games, the lowest score rating is "Amoeba", rising through the ranks of "Jock" and "Manager" to the prestigious "Nerd".

Next comes a load more videos and animations — the Campus Cam shows life behind the scenes at Redmond, the MSTV shows the future of television, and the Reject Bin shows MS products that somehow never made it to release. Meg and Graham pop up from time to time, and MicroNewsFlashes enliven the desktop with company announcements. For instance: "2:15 — Attention! We are the victims of an attack by a terrorist organisation! Do not, repeat not, stop working"; "2:23 — The Company has now acquired the terrorist organisation and the situation is back to normal."

As you explore and play, you progress from Technical Support through Applications Programming and upwards. Each level has its own desktop theme and reveals more videos and animations. The satire is wickedly funny, there's an unrequited love-story sub-text and not a lightbulb joke to be seen. The only fly in the ointment is that at time of writing it isn't on sale in the UK, but you can get the feel of it from the Parroty Interactive web site (*see "PCW Contacts", opposite*).

Prince — charming

And now for something completely different but also unavailable in the UK. Antoine de Saint-Exupéry's story of Le Petit Prince has been charming adults and children for over 50 years. It's the story of a pilot who makes a forced landing in the desert, where he is befriended by the little prince who recounts his tales of the strange worlds he has visited and their stranger-still grown-up denizens.

French publisher Gallimard has released a CD-ROM version. As with all adaptations, my perennial fear is that the adapters will have "improved" on the original to the point of ruining it. Not so here: the text is scrupulously preserved (and narrated by actor Sami Frey) while Saint-Exupéry's original watercolour illustrations have been transformed into a 2D and 3D animated world without losing their simplicity and delicacy.

You can read the story or have it read to you and the book is full of surprises. There's also a lot more outside the story. Visit the Asteroid B-612 and you will have to tend the rose, but also prevent the baobab tree from destroying the asteroid. Visit the earth and you will, in time, tame the fox. When you've tamed the fox, he'll escape from the CD-ROM and reward you with… well, I'll keep that as a surprise.

There's also an album containing photos, sketches, replicas of pages from Saint-Exupéry's diaries and biographical notes going from his childhood to his stay in New York, where the book was written. Although this is by no means a complete biography, it does put the allegorical tale of the little prince into the context of the author's life as a pilot and writer. Saint-Exupéry himself

The story of Le Petit Prince is now on CD-ROM

was stranded in the desert after his plane broke down and was rescued by a Bedouin after three days walking without food and water, and his brother (who may or may not have been the model for the prince) died when the author was a child.

In all, this really is a superb production, but once again there is a tiny snagette: at the moment it's only available in French. Even so, the language is fairly simple and it's definitely worth grabbing a copy next time you fill your car boot with cross-channel duty-free booze.

Cultural karaoke

Regular readers may recall that in February's column I was singing along with Blur and INXS. This month we move culturally upmarket. Imagine a theatre, with yourself on stage. There is an orchestra and a choir at your disposal, and a microphone in font of you. The conductor awaits.

The Italian recording company G7 has, to put it bluntly, come up with Karaoke Opera. But not just any old opera, you understand: there are 140 airs from the best of Italian, German and French operas specially recorded by the Compagnia d'Opera Italiana under the baton of Antonello Gotta. Various hybrid CD-Audio/CD-ROMs exist in bass, baritone, tenor, mezzo and soprano flavours, with scores, notes and the facility to listen to the pros before you record your own attempts. Nessun Dorma is included so you'll be able to keep the neighbours awake, but this is aimed not just at Pavarotti wannabes but at serious students of music, performers and schools.

Again, unfortunately you'll have trouble finding this (G7 was still looking for a UK distributor at the time of writing), so don't hold your breath. But try the rather strangely linear (and as far as I can tell, totally silent) web site.

Boogie on down

Returning to the UK and availability, no less than six CD-ROMs came my way courtesy of the BBC this month. Unfortunately for me, all the best ones have already been reviewed in *PCW* recently, so I'm left with Noddy and Mastermind. Since I can't abide either, I'll pass, and move on to the next contestant.

From Attica, also a British publisher, comes "Wannabe a Pop Star — Smash Hits". Presented in cartoon style, you first have to get your band together by auditioning musicians in the traditional garage. I note here that Attica has done a sterling job in mixing a politically impeccable assortment of race, gender, body shape, regional accent and musical style.

Next, you're off to the church hall to rehearse. Here, for each of the five band members you can choose verses, choruses and bridges, mixing and matching until you get the sound you want. Astute (or at least, non tone deaf) readers will realise that this means every song will be composed of the same chords in the same order and time, but nevertheless, there's a lot of variation in style.

Wannabe a Pop Star? Beat them old recording contract blues and have fun engineering your own meteoric rise to virtual stardom

Next in this meteoric career comes the recording studio where you can refine your saved song by adjusting levels and adding extra sounds. Finally, it's off to the concert hall to "perform" live and see how far up the charts your single has climbed. You can save as many different bands and recordings as you want and compare their chart progress. Great fun at first, but the musical constraints of getting the various chunks in time and in tune don't offer lasting fascination, unless you can listen to G, B-flat, F, C for hours.

Furry fun

And finally, this month's award for technology in action. The Monimal, I kid you not, is a furry animal-head cover for your monitor. It comes in a variety of species including lion, moose and sheep. Mine was a cow, of the Holstein-Friesian persuasion, and came with a load of sticky Velcro and a disk containing some rather naff screensavers. Although the "dry-clean-only" cow is rather floppy of horn, it has brought a smile to the face of everyone who has seen it. Which is more than can be said for the Active Desktop. Monimals cost £14.99 from Dixons, Kaleidoscope,

Go to work on a moose

PCW Contacts

Attica 01865 791346 www.attica.com
Cantolopera www.cantolopera.com
Gallimard Petit Prince www.gallimard.fr/multimedia/code/pp.html
The Monimal Trading Company 0171 734 8939, www.monimals.com
Parroty www.winblows.com

Letters

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or fax **0171 316 9313**

Why not allow pupils to voice their opinions when it comes to IT in schools? (see *What about us kids?*)

What about us kids?

In your recent article Education and IT (*PCW*, March), Andrew Charlesworth writes: "This is important to anyone who has a child in a British school, teaches in one, or cares about education *per se*". I believe one important group has been left off this list; the children.

It may be that Mr Charlesworth doesn't believe children have any say in their own education. It may be that he thinks they know little about computers and education. Of course, it may be that the fact simply slipped his mind.

As a 15-year-old attending a comprehensive school in Surrey, I believe that I have a valid opinion concerning IT in my school, and indeed, my school does take into account the views of pupils on this matter. But I feel this may be an isolated case. Unfortunately, many schools (and the Government itself) do not recognise that in a situation where many pupils are more computer literate than the teachers, there is a need to take our opinion into account.

Chris Norris
chris@crazy.force9.co.uk

Andrew Charlesworth replies: I would have thought the wording "anyone who…cares about education per se" included children. The schools I've talked to seem to lack guidance on IT, beyond government ministers telling them that it's the key to raising educational standards, so they would do well to listen to their knowledgeable pupils, as yours obviously does. But the whole point of the article was to highlight the tension between training (preparing people to perform a specific task) and education (broadening their horizons). IT in schools often reflects the former rather than the latter.

Hairnet heaven

I was fascinated to read the Michael Hewitt interview with Emma Solomon and Caroline Lambie (*PCW*, March). They have identified a large market.

I live on the Balearic island of Menorca where the vast majority of expatriates are over 50 years old. For the past four years I have been running courses in basic computer literacy and, more recently, the internet specifically for this age group. I identified this need simply because I am 62 years old and am looked upon as a complete oddity because I understand and enjoy my computers.

This older group of people are interested but apprehensive and, as pointed out by Emma in your article, the men particularly reject the idea of their ignorance being made public, whereas women don't worry so much about how they are perceived by others.

My success is largely due to my age; people don't feel so threatened being shown how to do something by a person of my age, who is less likely to treat them as boring old farts!

Good luck to the girls. Believe me, there is an enormous market out there. My age group has money, time and intelligence. We feel somewhat rejected as we were in the wrong place at the right time when it all happened.

Tony Deane
tonydeane@bbvnet.com

No cache bonus

A friend of mine recently upgraded his PC from 32Mb SDRAM to 96 Mb SDRAM. As he is new to PCs, I have been helping to set up his system.

He mentioned that when he had bought the 64Mb DIMM the shopkeeper had told him that this would disable his cache. I investigated this and, sure enough, the machine runs more slowly. I investigated further, and it turns out that the TX chipset only caches the first 64Mb of RAM: any more and the processor has to go directly

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to main memory. It gets worse, as apparently Win95 loads into the top of the available memory, so the O/S is not running in cached memory!

He is currently doing some tests to see if the applications he uses are faster with 96 or 64Mb of RAM. He is most interested in photo manipulation and has a P200MMX-based system. For this type of work what would you recommend as his best course of action?

Tony Flaherty
tony.flaherty@virgin.net

PCW Replies: Intel 430 FX, VX and TX chipsets have a cacheable limit of 64Mb RAM, although the earlier 430HX has a ceiling of 512Mb. Intel suggests contacting the manufacturer of your friend's motherboard to verify its maximum cacheable RAM. The Pentium IIs current LX chipset can cache up to 512Mb RAM.

So if you have, say, a 430TX board with 128Mb RAM, only the first 64Mb will be cached. Windows 95 applications load from the top to the bottom, so in this instance won't be cached and will run slightly slower than a 64Mb system. However, this is a simplistic description. Windows 95 employs virtual memory to manage its memory requirements, using space on your hard disk when it runs out of RAM. Uncached RAM is still hugely faster than accessing a hard disk. Applications which operate with very large files, such as image or multimedia packages, will always greatly benefit from operating in as much as possible in RAM, cached or not, rather than resorting to virtual memory.

Generally, if you notice your hard disk light always flashing during current work, then it's hammering the virtual memory and will benefit from more RAM, cached or not. If you're just into general office applications and modest multimedia, your friend will be best off sticking with the maximum cacheable RAM supported by his board, which for many systems is 64Mb. Alternatively, you could move to a more serious OS such as NT which always uses cached RAM first.

Happy Birthday to us

On your hobby horse

1978 was a year that was to change my hobby and interests for the future. That was when I bought my first computer magazine: Volume 1, Number 1 of *Personal Computer World*!

For me, the prospect of being able to build and control my own microprocessor system was very attractive, especially as *PCW* featured full details of such a project in that issue. It was the 77-68, The Mighty Micromite, written by Tim Moore.

By the time I had built a power supply and constructed the mighty micromite, I reckoned it had cost me about £60 and for that I could enter the machine code instructions in binary on the eight switches fitted for this purpose, and at each address, which was also selected in binary on another set of switches.

With its 256 bytes of RAM and its 8 LEDs one could spend several days programming the CPU to flash LEDs like a Christmas tree, or by attaching an audio amplifier across one of the LED's and switching it on and off at an audible frequency, play several tunes which would appear

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Happy Birthday to us (contd)

regularly in the 77-68 User Group Newsletter.

One day, after a power surge crashed my programming session for the fourth time that night, I succumbed to buying the latest black box which featured the same family of micro processor; the Dragon 32K.

Suddenly I became aware that I had no idea what made this box tick. If things went wrong I could no longer tweak the operating system. It was a move I could not reverse, but it was a dark day when I gave up my baby for a plastic box!

Fred Burnett
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First bite of the apple

I was flying back from the US in September '77 when I read an advertisement for an Apple II, from a firm with the same name in California. When I got home I rang to order one, only to be told that it had just appointed its first distributor, Personal Computers in Bishopsgate and that a shipment was already on its way.

A week later, the shipment arrived and, £1,750 the poorer, I proudly took home one of the first Apple II's in the country. It was incredible, with 16K of memory and two paddles, although you had to provide your own tape recorder and TV! I learnt Basic, wrote a program to teach myself to touch type, bought a further 16K of memory the following year in New York for $250, searched everywhere for programs, and regarded it as a most fascinating toy.

One day, Visicalc arrived and changed my toy into a tool. It is difficult now to recall the impact of Visicalc: it was the first of all the killer apps. In due course, Wordstar and the database programmes arrived and then IBM made the PC respectable and ubiquitous.

All that was later, of course, but it was Visicalc that made us all realise that the PC was here to stay.

Lord Young of Graffham
young@youngassoc.com

Terminal shock

Congratulations! Twenty years have seen us all change but I'd like to stretch your imagination by adding another ten years and suggesting somewhat radically that the greatest development ever in the history of computing is something we all take for granted: the VDU!

In 1968, I found myself in the Oxford University Computing Centre with a KDF9 the size of a small house, using the now long forgotten ALGOL language and the now occasionally-used FORTRAN to run biochemistry experimental output. Producing an enzyme kinetics curve with the plotter was seen somehow as "cheating" by the supervisors who marked my work! The frustrations of submitting programs and data on punched tape or cards with a 24-hour turnaround time before you saw your results, were huge.

The first terminal I ever saw was a quantum leap in accessibility. To actually be able to run your program, see the results, correct the code and run it again in a few minutes was somehow magical and at the same time unbelievable!

I now have thousands of times the processing power in my own home and whenever I find myself swearing at a fatal program error I always try and think back to the times when I'd drop a stack of punched cards on the floor wasting hours of programming time! Keep up the good work. I look forward to receiving my first copy of *PCW* on digital paper before another 20 years are over!

Jonathan Bayly
jonathanbayly@compuserve.com

Lead us into temptation

That first issue of *PCW* was a revelation to me. There were systems with proper keyboards, TVs used as VDUs and BASIC. The caption on the front cover read: "This year, get your own computer." I took that instruction to heart and later that year I spent over £400 on a proper computer, in kit form, which I had to build, myself.

It helped to be handy with a soldering iron as a lot of gear came in kit form, and the magazine had plenty of circuit diagrams and instructions for building your own equipment. It saved a lot of money and you also knew exactly how all the stuff worked.

Looking back at that first issue it seems amazing now just how many different systems were available — and there's no mention of Microsoft. But the biggest change is surely that back then you only had 64 pages! Keep up the good work and I hope the next 20 years are just as exiting.

Michael Lister
mikelister@compuserve.com

LED by the hand

Two toggles, two switches and two LEDs. All supplied by the Open University. That was back in 1974. Early days for the OU and early days for computers.

It was great fun: you could add two and three, which was not bad when we were just moving away from adding machines with a big handle which you pulled when you set the numbers. And I could convert hex to binary in my head, at least up to 16!

Mike Heilbron
heilbron@cheerful.com

Lofty memories

Rummaging through the loft recently, I came across several boxes I had almost forgotten about. Inside were the various "parts" of my first computer; a Tandy TRS-80 Model 1.

What memories this brought back. I recollect spending £2,500 for this system (excluding software) back in the late seventies. Hardware modifications I made included an interface for lap counting and race control at a model electric car racing club. It also operated the start lights and finish siren and was used at our local model boating lake and at the model flying club. I would be pleased to receive correspondence from other readers who have used the TRS-80 Model 1.

Norman Dickinson
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Personal Computer World

1978-1998 20 YEARS

GREAT 20 YEAR COMPETITION p134

SPECIAL SOUVENIR SUPPLEMENT

20 years of *PCW*

Welcome to our 20th anniversary special, chronicling the most important and interesting events of the past 20 years, the evolution of key companies and products and, of course, a glimpse into what the future may hold. Fortunately we had the full 20 years' worth of *PCW* on hand for research, but trawling through 240 magazines was no small task. The entire team pored over every issue to find the stories you'll read over the following pages. I'm sure you'll find it as interesting to read as we did to produce!

For myself it was quite an emotional experience. I expected waves of nostalgia but hadn't anticipated how powerful they'd be. They say you never forget your first kiss, but a few years earlier I had an equally powerful experience: I know it sounds a bit sad, but I really will never forget my first computer. When I was all of ten years old, the Sinclair ZX80 changed my life, Yes, that's me in the corner in the photo below, not quite in the spotlight but nonetheless acquiring a new religion.

I was about to finish my formative years at Cherry Tree primary school in Romiley, Cheshire, when we learnt of a competition to win a computer (for your school, that is). A few well-placed "I would like a computer but would make do with something that resembled a large calculator" later and we actually won! I'm afraid to say my contribution wasn't the greatest and I was cropped out of the photo which later appeared in the *Manchester Evening News*.

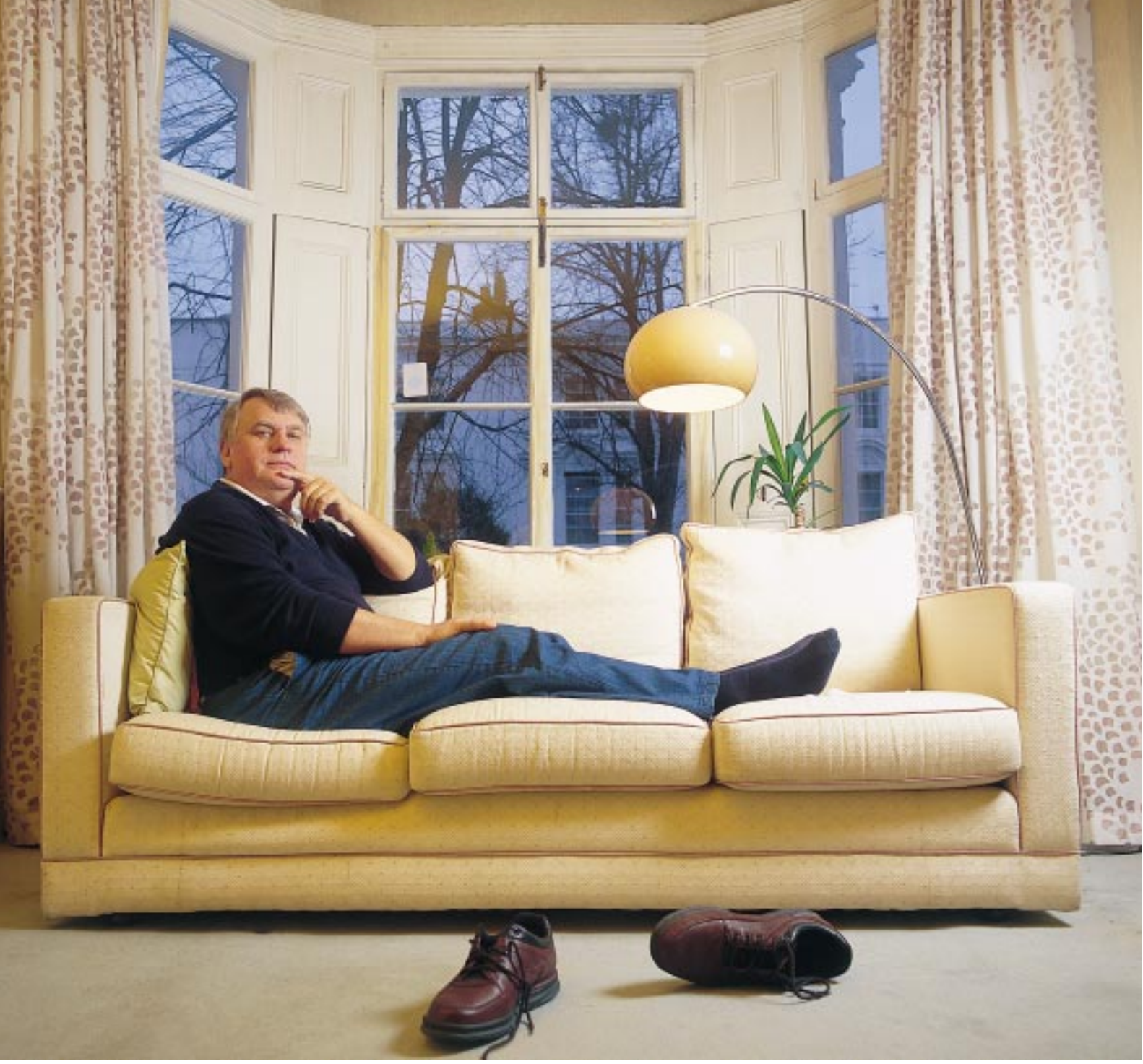
Fame didn't matter to me, and neither did the fact that I had to share our prize with hundreds of other kids. I cherished it as if it were my own, and didn't care when the hard kids snapped the corner off the keyboard. Hey, who needs punctuation anyway? The bug had bitten, and I persuaded my parents to buy a Sinclair ZX81, then a ZX Spectrum, a Commodore 64 and, finally, an Atari ST. I'm still not sure today whether they understood why I needed the next big thing in home computing, but at least I can now say it helped get me get where I am today.

By the early nineties I was Mac'd and PC'd up and my interest in computers today is as all-consuming as it was then. I am delighted to be working on the best personal computer magazine, particularly on its 20th birthday. Enjoy the issue, and here's to the next 20 years.

Gordon Laing

Managing Editor

Anniversary Contents



Creature comforts: With a frenetic but rewarding life in the publishing industry behind him, Zgorelec can afford to sit back and put his feet up

Founding father

PCW's founder, Angelo Zgorelec, came to England at the end of the sixties with an interest in technology. The rest, as they say, is history. Michael Hewitt met him.

"I hope you can understand my English with its heavy, Slavic accent," said Angelo Zgorelec as we made our introductions in the office of his Earl's Court home. The accent comes from his having been born in a little village called Koprivnica, 60 miles north of Zagreb, in what was then Yugoslavia, just over 57 years ago. Since then he's been variously a student journalist, fruit-picker, washer-up, hospital porter, newsagent, publisher, and the head of a small property company. And in between times he summoned up sufficient energy to found some techie magazine called *Personal Computer World*, which, by all accounts, is still going strong.

Angelo first discovered an interest in journalism when he was just 15 years old. He began by supplying sports stories to the national press. Then, in the mid-sixties when he went to Zagreb University to read history, he joined the student newspaper and soon became one of its editors. But not for long. One evening, a functionary visited him to ask why Angelo wasn't in the Communist

PHOTOGRAPHY by Nick Dawe

"They [The Computer Workshop] had a computer in their window. I forget exactly what it was, but every evening I used to go there just to stand outside and look at it. I thought it was absolutely amazing"

Party. In the Yugoslavia of the sixties, trying to be a journalist without carrying a Party card was a *faux pas* as massive as trying to be a chief constable without joining the Masons. So the aforementioned functionary gave him a choice: join — or else. "I didn't like being told to believe in something in which I didn't," said Angelo. "So I refused and was dismissed from the newspaper. I'd been getting increasingly fed up with all the restrictions on life in Yugoslavia, anyway, so this was the last straw for me. Then I suddenly found out that the university was offering students the chance to go abroad, fruit-picking in England — I jumped at it."

With just £4 in his pocket, Angelo arrived in the UK and set to picking plums. He soon graduated to washing dishes and then hospital portering. He also kept up the journalism, writing reports on "swinging London" as a freelance for the Croatian press. Then came his big break, businesswise, when he managed to convince a distribution company called The Seymour Press to allow him to sell *The International Herald Tribune* and assorted other US publications via street pitches and other small-scale retail outlets. With the money made here, and in other ducking-and-diving routines, he was soon able to afford to buy a small newsagent's shop.

At this point, a thought came to him: instead of simply selling someone else's publications, why not set up one of his own? After all, he now had enough money. But on what subject? He had always had an interest in technology of all sorts (solar power and satellite communications, for instance) so Angelo knew it was going to be technology related.

"Then one day I saw a front-page article in the *Wall Street Journal* describing how computers were about to revolutionise the world. I found it fascinating. So much so that I cut it out and kept it in my pocket. Round about the same time, the first computer shop in London, The Computer Workshop, opened on Ifield Road. They had a computer in their window. I forget exactly what it was, but every evening I used to go there just to stand outside and look at it. I thought it was absolutely amazing."

Between drools, it didn't take Angelo long to decide that his proposed magazine was going to be about computers. But would there be a market for it? Although *Practical Electronics* regularly devoted six pages to what passed for computers in those days, there was no computer magazine *per se* in the UK, unless you counted the US import, *Byte*. This was probably because computers were still largely a minority, hobbyists' area, like model aircraft. Most people put their own together from off-the-shelf components. If you were prepared to shell out upwards of £2,000 for, say, an Intel 8080 processor, 16Kb of memory, a keyboard, and a cassette tape recorder for storage, you could end up with something that was pretty good for playing a game of hangman. It therefore required something of a leap of faith to believe that one day these things would become standard items of consumer electronics equipment. But Angelo's faith leapt, nonetheless.

"I found out that *Byte* magazine was holding a computer show in New York and so I decided to fly over there and take a look — at the time, Laker Airways was starting to sell flights for £65. I reckoned that if computing looked likely to take off in America, then it could take off here, too. So I went to New York and turned up at the exhibition. There was a two-hour queue to get in. I essentially said to myself: 'I don't need to see anything else. If people are prepared to queue for two hours, this is going to be huge'."

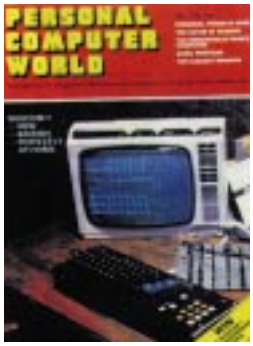
Back in the UK, Seymour Press offered to distribute the magazine, although they tried to convince him to stick to some subject with more of a future, such as CB radio. But Angelo was adamant. He then asked one of his friends, a beat poet and "permanent student", Meyer Solomon, if he'd like to edit it. Meyer didn't have anything else on, so he agreed. And the next question was: what were they going to call the publication?

"It was always going to be …something… 'World', but it was the first word that took a lot of thought. Eventually, there were two choices; Micro Computer World or Personal Computer World. In the end, I settled on the latter." But at the time, the idea of a "personal" computer was almost as woolly as that of a "personal" concrete mixer.

Angelo assembled the first edition of *Personal Computer World* in the Troubadour Café in London's Old Brompton Road which, co-incidentally, was where Bob Dylan made his UK début. Its appearance was timed to coincide with the launch of Britain's own Microcomputer, the Nascom 1, a colour picture of which appeared on the cover at the time. This must have helped. When *PCW* hit the streets in February 1978, it was an immediate sell-out. All of the 30,000 print run was snapped up, and the magazine soon recouped its £12,000 start-up costs. "It's much better than anyone expected it would be," said journalist, Guy Kewney, upon being presented with a copy — "Which is one of the nicest compliments I've ever received," said Angelo.

PCW went monthly from the second edition and hasn't really looked back. Angelo himself was publisher for 16 issues, and then went into partnership with Felix Dennis. Eventually, the title was sold to VNU Publications for £2.5 million. Angelo's share helped him pay for his house and much else, besides. So, does he still keep his hand in? "Although I use computers all the time, I'm not really up to speed on the development side of things any more. I'm astounded at the progress that's been made over the past 20 years, of course. I love the internet, for example, and the fact that every day I can discover something new. But in the future, I'll watch from the sidelines. Besides, at my age, it's time to slow down a little." ■

1978



Dawn of the revolution

Desktop computers were called micros (as in Micro-soft) to distinguish them from larger minicomputers.

As the year began they were still far too expensive for most people in Britain, unless they could build one. There was no Microsoft operating system. Most computers used Digital Research's CP/M.

In **May,** the first edition of *Personal Computer World* featured the £240 Nascom 1, which you had to solder together yourself.

In **June** Intel launched the 16-bit 8086 processor, first of the dynasty that was to power the PC. Around the same time, Microsoft began an 8086 version of BASIC.

PCW reviewed the £700 6502-based Commodore Pet, which had a 9in monitor and between 8Kb and 32Kb RAM.

In **September** *PCW* looked at the TRS-80 which was £200 cheaper. It had 4Kb RAM and for storage you plugged in your tape.

In **December** Atari launched its 400 and 800 in the US. And Epson shipped its groundbreaking MX-80 dot-matrix, destined to be the buzz of numberless offices.

The biggest change of the year was in mindsets. No less than 30 thousand people bought *PCW*'s sell-out first edition: people were coming to realise that computers, long considered the realm of boffins and big business, were within reach of their pockets and brains. The IT revolution had begun.

Retrobytes

- The $360 4.7mHz 8086 processed 0.33 million instructions a second (MIPS).
- An Altair system with twin floppies, 64Kb of RAM and printer cost from £6,781.
- £1,500 (ex VAT) got you an Apple II and a Sony TV to show its colour display.
- Microsoft revenues first topped $1m at $1.36m.
- Intel made $44m on an income of £399m.
- IBM made $3 billion on revenues of $22.8 billion.

Home brew with a difference

Home brew was very much in when *PCW* first started. The first machine we benchmarked in the first issue was the Nascom 1, which you had to solder together yourself.

This was not everyone's idea of fun so the Nascom was not one of those machines to stand the test of time, unlike the PET 2001 reviewed in the second issue. We were bullish about its likely success: "It is a successful attempt at placing computing within the reach of thousands and there seems little doubt that thousands worldwide will buy it." As it happens, we were not far wrong.

Intel makes the 8086 state

In the very first issue of *PCW* we took a look at the new 8086 processor from Intel. Based on the 8080 which, in 1974, had powered the influential Altair 8800, the 8086 was created by two engineers in just three weeks. The major change from the 8080 was that the 8086 was the first of Intel's 16-bit processors. Work on the processor began when Intel realised the i432 project was in deep water.

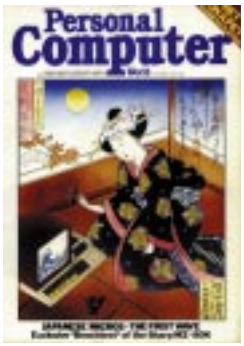
This processor's direct descendant, the 8088, released in 1979, was chosen by IBM to put into its first PC, which in turn shot Intel into the Fortune 500 where it has been firmly entrenched ever since.

Apple II brings colours to life

The Apple II was one of those landmark machines that changed the early days of computing. It was originally débuted at the first West Coast Computer Fair in San Francisco in 1977 and *PCW* reviewed it in its fourth issue. We cited the reasons to buy it as: "Its colour graphics, its extra high-resolution graphics package, its extreme portability and its high-quality construction." In retrospect, however, it was the colour graphics alone that won the day. It could show 16 colours at a resolution of 280 x 160 pixels, which at the time was remarkable for a machine in its price bracket. When we reviewed it in the August 78 issue it cost £1,250 (ex VAT) for the 16Kb version, although you would also need to buy a colour TV to get the most out of those graphics.

It was based around the MOS 6502 processor and had BASIC in ROM and just 4Kb of RAM. At the end of 1978 the Apple II got a boost in the form of a RAM jump to 48Kb, but the big advance was the introduction of a low-cost 5.25in floppy drive. Up to then the Apple II had used an audio cassette drive for storage, mainly because floppy drives, which had been around since 1971, were so expensive. However, the Apple II floppy drive was a low-cost alternative and most existing Apple II users went out and bought it. And a year later when the first version of VisiCalc was launched with the Apple II as its only platform, Apple's future was secure, at least for a short while.

1979



The Space Invaders games console arrived and kids across the country became hooked on Pacman.

Hayes, whose command set still runs modems, shipped its $380 Micro modem running at all of 300 baud.

In **May** Software Arts launched the VisiCalc spreadsheet, invented from scratch by Don Bricklin and Bob Frankston.

In **June** Intel launched the 8088 chip, similar internally to the 16-bit 8086 launched in 1978 but with an 8-bit external bus. It was to power the first IBM PC.

The Japanese invasion

In **July** MicroPro released WordStar, the model for all early word processors.

In **August** came the Vulcan database which Ashton Tate was to turn into the world-beating dBase II.

In **September** came the 16-bit 68000 from Motorola. It was to be to Macs what the x86 dynasty was to PCs.

Most computing still ran on 8-bits. As did the Sharp MZ80K, splashed in *PCW*'s **October** (below and left) as the first wave of Japanese micros. In the same month Atari shipped its 400 and 800 models.

In **December** Xerox took 1,000 Apple shares worth $1 million in return for giving the company access to projects at its Palo Alto research centre.

It has been kicking itself ever since. In effect, it had given away the mouse-driven graphical user interface which was to become synonymous with the Macs and the future of computing.

Retrobytes

- The $360 Intel 8088 processed 0.66MIPS at 5MHz or 0.75 MIPS at 8MHz.
- A 4MHz Z80-based Horizon PC with dual 380Kb floppies, 24Kb of RAM and 32cps printer cost £3,616.
- £1,500 got you 23 percent of a 10Mb hard disk.
- Microsoft had revenues of $2,390,145.
- Intel made $78 million on an income of £661million.
- IBM made $3.3 billion on revenues of $21 billion.

VisiCalc takes the PC from youth to maturity

VisiCalc was the first of the killer applications. From the time it first appeared, personal computers could stop being regarded as pointless toys for nerds and became serious business tools. VisiCalc was essentially a

spreadsheet package on which you could do your accounts. The revelation came when you altered one figure and saw straight away it could affect the rest of your budget. This let small companies make the kind of sophisticated financial projections previously available to only large companies with mainframe or mini-computers

It was developed in 1978 by Dan Bricklin and Bob Frankston, working on a computer on a timeshare basis. Bricklin developed the functional design and documentation, at the same time as studying for an MBA, while Frankston programmed at night when computer time was cheaper. When the product first went on sale it was just 25Kb long and cost $100.

VisiCalc proved not only the making of Bricklin and Frankston, but also made a significant impact on the success of Apple, as the first version of VisiCalc was produced for the Apple II. Versions for numerous other platforms were produced and it lasted well on into 1984, when a little application known as Lotus 1-2-3 stole its crown.

The word is out on WP

In our January 1979 issue *PCW* reported on a letter-editing system being developed by ICL Dataskil. The contents page urged everyone to read what was called "this important article". However, things were moving fast. Later that year MicroPro released WordStar and Apple released AppleWrite I for the Apple II. WordStar was not the first word processor, but it did exploit the market potential and held many users captive until the release of Word at the tail end of 1983. Also in that year there was much excitement about using word processors to create page layout for magazines and newspapers. In that year the *Times* had to close its doors due to action by journalists and the print unions, fearful of changes around the corner for the print industry.

The world turns Japanese

The Japanese invasion was upon us and *PCW* were quick to milk the imagery to the full (*see this year's cover, above*). However, not everyone was overly pleased by this turn of events: "Because of the Japanesee reputation in other fields, their arrival is being awaited with some anticipation — or trepidation, depending on your point of view."

Founded around the Z80 processor and with from 20Kb up to 48Kb of RAM, of which BASIC took up 14Kb, the MZ-80K was a solid workhorse, and Sharp was gunning after Commodore's PET which was the leading machine of the day. But Sharp made a big mistake in trying to corner the market by locking users into a proprietary technology: it eschewed ASCII for its own character codes.

p78 ➢

1980

This was the year computing became available to all but the very poor. The impetus was home grown, from a certain Clive Sinclair.

In **March**, SSI shipped WordPerfect 1.0 for Data General minicomputers.

April was a momentous month. *PCW* looked at the Acorn Atom, predecessor to the BBC Micro. But the sensation was Sinclair's ZX-80 (*below*) which cost just £79.95 in kit form. It had 1Kb of RAM and BASIC in 4Kb ROM, and it got kids across Britain programming.

Meanwhile, virtually unnoticed, Tom Patterson of Seattle Computer Products began writing a disc operating system (DOS) for an 8086-based machine.

In **May** Apple shipped the disastrous 2MHz Apple III, which boasted a 5.25in floppy drive and sold for between $4,500 and $8,000.

In **June** Seagate announced the first 5.25in Winchester hard drive. In **July,** in a legendary incident (*see PCW September 1996*) CP/M developer and DR founder Gary Kildall refused an IBM request to write the operating system for a new project called Chess. IBM turned instead to Microsoft.

In **October** Patterson sold Microsoft the rights to his DOS for $100,000.

In **November** Microsoft was contracted to provide software, including a rejig of this DOS, for the IBM project. It was, of course, the PC. It would sweep the world, and it would shake IBM to the core.

Power to the people

Retrobytes

- A 10MHz Intel 8086 processed 0.75MIPS.
- £1,500 bought you Pascal (£200), WordStar (£250) Pet Comaccounts, Compay and Comstock (£950) and a choice of utitlities.
- Support for the above software: £2,387 a year.
- Microsoft had revenues of $7.5 million
- Intel made $97 million on an income of £855 million.
- IBM made $3.5 billion on revenues of $26 billion.

Mission impossible

In 1980 Clive Sinclair did what everyone said was impossible. With the Sinclair ZX-80 he was the first man to make a computer that broke the psychological barrier of £100, finally making computing affordable for anyone who wanted to give it a go. If you were brave you could buy it in kit form for £79.95 and solder it together yourself, or you could save yourself £20 worth of heartache and get it ready-built for £99.95. It was based around an NEC Z80 processor running at 3.25MHz, had 1Kb RAM (expandable to 16Kb), 4Kb ROM and used a TV and cassette drive to display and store programs. You could expand the memory to 16Kb, but to buy the full amount would cost you £300.

It ran a form of BASIC that our first reviewer was a little scathing about: "The software of the ZX80 comprises the BASIC interpreter, the Editor and whatever else it is that does the rest of the work (Operating System seems too grand a title)", although he did go on to admit it was almost impossible to crash the system.

Third time unlucky

After the success of the Apple II, Jobs and Wozniak proudly marched ahead with the Apple III. Announced in the July issue, it had 128Kb of RAM, a 4Kb ROM, a built-in 5.25in disk drive and graphics on the motherboard. It could run most Apple II programs in emulation and came with a new operating system. It sold initially for between $4,340 and $7,800 but it was riddled with problems and bombed, nearly taking Apple with it. Some things never change. Apple crawled back into the running by bringing out a modified version later that year, with a better operating system and more RAM and ROM, and it was one of the first computers to have a 5Mb external hard drive.

Atari's born

Hailed in *PCW* as "the first of a new generation of home/personal computers", the Atari 400 and 800 set the mould for anything you would do with your home PC — play games, sort out your finances, run home education packages and maybe to run a small business. But it was as consoles that these machines made their mark. They were among the first to have player missile graphics and they had sound which could be played back through the TV's speakers. Its designer, Jay Miner, went on to bigger and better things, later designing the Commodore Amiga.

1981

This may appear now as the year of the IBM PC, but despite *PCW*'s splash (*left*), few saw it so at the time.

Other launches seemed just as exciting. In **January** Commodore launched the colour VIC 20, with a 6502 processor and 3.5Kb RAM for £190 (minus cassette). Sony announced the 3.5in 437.5Kb floppy disk.

In **March** Sinclair shipped his new, improved Z81 (*see below*). Around this time Quantum was formed to make 8in and 14in Winchester drives. We predicted that as production

The birth of the IBM PC

rose, a 6Mb drive may retail for as little as $1,500.

In **April** Adam Osbourne shipped a Z80-based desk machine with twin 100Kb floppies, 64Kb RAM and a modem for $1,785, bundling a software suite theoretically worth $1,500.

VisiCalc, running on Apple II and PET, topped the UK software sales list. Ex-*PCW* editor David Tebbutt said later, without hyperbole: "No-one, before or since, has created anything quite so revolutionary." (But see page 129).

The first true adventure game, Zork, moved from minis to be squeezed into 32Kb Apple IIs and TRS-80s. A typical command: "Attack Troll with Mace".

The IBM PC (*see below*) was launched in **November**.

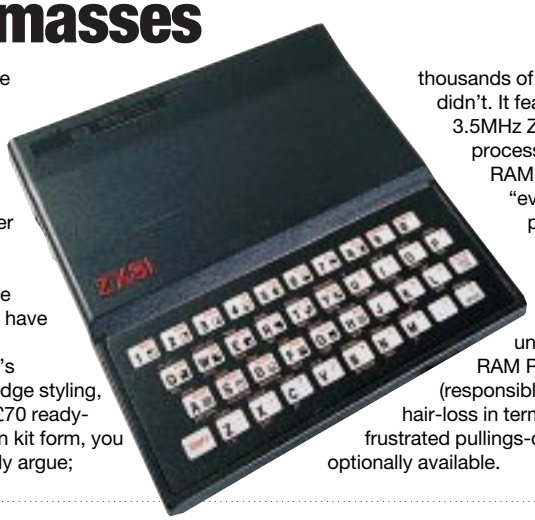
In **December** Acorn shipped the much-better BBC Micro which, with an associated TV programme, helped make Britain one of the most computer-literate nations.

Retrobytes

- A Superbrain QD CP/M machine with 700Kb of storage and an NEC Spinwriter printer set you back £3,745.
- £1,500 bought you half an Apple II, with 48Kb RAM and twin floppies.
- Microsoft had $16m revenue. Staff had grown from 25 to 128 in two years.
- Intel made $27 million on an income of £789 million.
- IBM made $3.3 billion on revenues of $29 billion

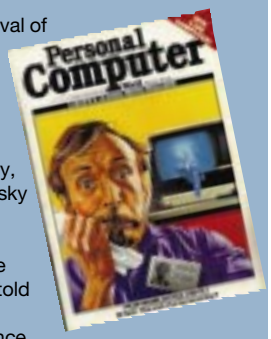
Sinclair's successor for the masses

Uncle Clive Sinclair cunningly reused the idea of naming his products after the year of release, and offered us the ZX81. It may have shared its predecessor's doorstop wedge styling, but costing £70 ready-built or £50 in kit form, you couldn't really argue;

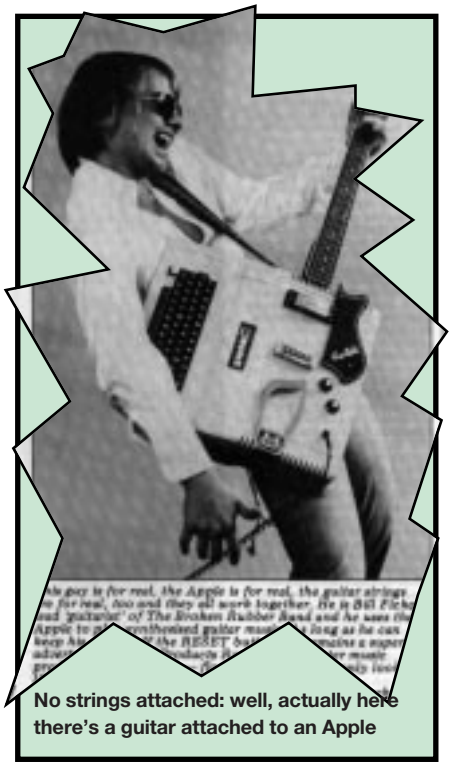


thousands of people didn't. It featured a 3.5MHz Z80A processor, 1Kb RAM and an "everything-proof" membrane keyboard. A thermal printer and unstable 16Kb RAM PAK (responsible for most hair-loss in terms of frustrated pullings-out) were optionally available.

Did The Last One have the last word?



February 1981 saw the arrival of what could have been "the last program you will ever need to buy". Named "The Last One" from Somerset-based David James and Scotty Bambury, it removed the need for pesky programmers and their complex languages. "We didn't know that we'd done anything clever until *PCW* told us," exclaimed Scotty. Unfortunately, in this instance, we wouldn't have known a clever thing if it had come along and hit us.



No strings attached: well, actually here there's a guitar attached to an Apple

The Jolly Giant makes everyone go green

November 1981 saw the "Jolly Giant deliver the goods". In a *PCW* world exclusive we flew to Florida and tested the very first IBM Personal Computer.

IBM listed the main system unit (Intel 8088 at 4.77MHz) with 16Kb RAM and keyboard for $1,265, a mono display at $345 and a matrix printer for the bargain price of $755; an additional 64Kb RAM came in at $540 and you had the choice of running CP/M or the unproven fledgling Microsoft DOS.

The last word goes to then editor David Tebbutt: "The only thing missing at the moment is a wide selection of packages, but I rather feel that the whole world and its grandmother will be frantically trying to fill that particular gap." Things would never be the same again.

BBC does world a service

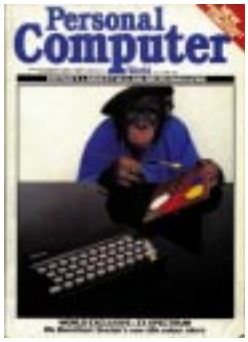
The year ended with a rave review of the BBC Micro, a machine originally commissioned by "auntie beeb" to accompany a series of TV programmes aimed at increasing the public's awareness of computers.

The "Making the most of the micro" campaign helped make Britain one of the most computer-literate countries in the world. Indeed, at one time there were more computers per head in the UK than anywhere else in the world. To be fair, much of the UK penetration was due to Sinclair, a company widely predicted to get the BBC contract.

In the end, the deal went to Acorn, whose latest development, the Proton, needed little modification to meet the BBC's specification. £235 got you a 6502 processor, 16Kb RAM, a great keyboard and eight rather impressive graphics modes. Production delays didn't see the BBC Micro really take off until the following summer, when we blessed it with a further ten-page benchtest.

p80 ➢

1982



The PC came to rule not because it was better than its rivals (it wasn't) but because software houses could not write for multiple platforms.

The industry needed a focus and IBM, dominant like no IT company is now, was a natural candidate. The range of PC applications soon became unbeatable.

But rivals prospered for a while. **January** saw the launch of the bestselling $595 Commodore 64.

In **February** came the Sirius (*see below*) and the founding of both Compaq and Sun. Intel launched the 6MHz 80286 which could access 16Mb RAM (most of it invisible to DOS).

In Britain, more flurry was caused by the **April** launch of Sinclair's ZX Spectrum.

In **June** Columbia Data Products launched the first PC clone, seeding a new world industry. Epson shipped its 3lb HX-20 notebook.

In **August** Wales-based Dragon Data bravely launched the £199 Dragon 32.

In **November** six-month-old Lotus launched its 1-2-3 spreadsheet and Compaq introduced a portable PC after spending $1m developing a BIOS that did not breach IBM's copyright.

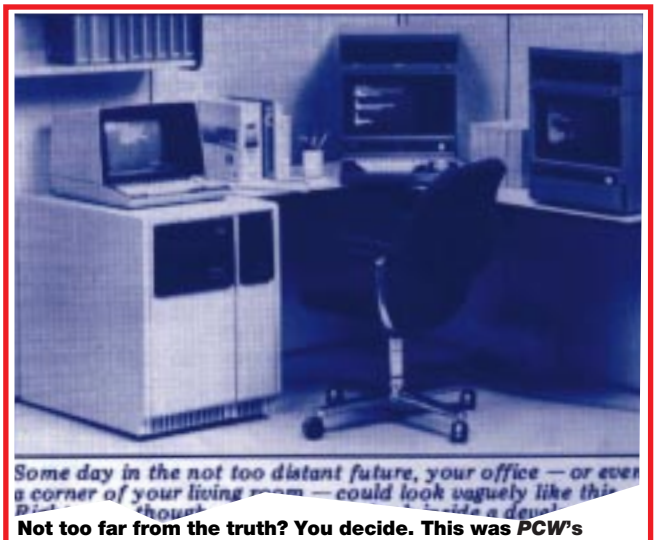
Apple was riding high, becoming the first personal computer company to top $1 billion in sales, and the Mac was yet to come.

Oh, and TCP/IP was named the protocol suite for the collection of linked nets, including Europe's new EUnet, that was coming to be known as the internet.

The first of the clones

Retrobytes

- A 6MHz Intel 8286 processed 0.9MIPs.
- A Sharp MZ80-A with an Epson MX80 printer and custom interface cost £787 (ex VAT).
- £1,500 bought a 6Kb Osborne "portable" and £100 worth of software.
- Microsoft had revenues of $24m and 220 staff.
- Intel made $30m on an income of £899m.
- IBM made $4.4 billion on revenues of $34 billion.



Not too far from the truth? You decide. This was *PCW*'s vision of an office of the future

Sirius business

Chuck Peddle, designer of the 6502 processor and the Commodore PET which first housed it, is widely regarded as the man who started the personal computer industry. Chuck ended up leaving Commodore to set up his own company, Sirius, which in early 1982 released its first product and, indeed, the first serious competitor to the IBM PC. He described his Sirius 1 as a third-generation computer, based around a 16-bit processor (the Intel 8088 running at 5MHz) and plenty of memory (128Kb RAM). It also boasted a pair of 5.25in floppy disk drives, each capable of cramming an impressive 600Kb on one side of a disk. The basic system cost £2,395, or £3,890 with 512Kb RAM

Above all, Peddle says, they should be designed for the end-user rather than the programmer, and be regarded not so much as a computer but a piece of business equipment. The Sirius came with CP/M-86, the 8086 version of the CP/M operating system, Microsoft Basic-86 and an early WordStar; MS-DOS was available later that year.

Showing true colours

Colour, sound and high-resolution graphics for £125? It could only be the new Sinclair ZX Spectrum, a home computer so revolutionary that the expected name, ZX82, was simply not good enough.

The Spectrum measured 233 x 144 x 30mm, weighed 520g and, unlike its predecessors, actually boasted keys that pressed down — well, squidged down, anyway. It may resemble a desk calculator today, but at the time we described it as "extremely elegant", or at the least, truly rubbery.

The earlier ZX81 could be expanded to 16Kb RAM, but the £125 Spectrum came with it as standard. Another £50 got you the vast 48Kb model, but both at the time of release were mail order only. Unfortunately most of us had to go through two or three models before we got one that worked, but the British public couldn't get enough.

The graphics at 176 x 256 pixels were fairly high resolution at the time, but you could only assign colour to them in considerably lower resolution blocks of 24 x 32 characters. Sneaky. The sound facility was aptly named BEEP, as that was about all it did and also cunningly froze the processor while it was at it.

Most people remember the inspired keyboard-entry system (first seen on the ZX80 and ZX81) where a single press would pop up entire words: most keys had up to five such words or symbols.

Programming the 3.5MHz Z80A processor had never been so much fun. Programs were loaded by cassette, with the fabled MicroDrive tape system scheduled to arrive later at around £50 each and the same again for the interface. A thermal printer was also available.

The ZX Spectrum really took off as a games machine, spawning an enormous market which flourishes to this day. Most of its owners were closet programmers too, which helped place the UK as the highly computer-literate country it is today.

p82 ➢

1983

Apple looked to be making all the running in **January** when it unveiled the 5MHz 68000-based Lisa, its first attempt at a mouse-driven graphical user interface. Lotus spent $1m launching 1-2-3, which needed an unprecedented 256Kb RAM.

In **March** IBM launched the $5,000 XT with 128Kb RAM, a 10Mb drive and a 360Kb floppy: a configuration the new MS-DOS 2.0 was designed to support.

In **April** Microsoft showed versions of Word and Windows. In **May** Fujitsu announced a new 256Kbit RAM chip and Sony showed a 3.5in double-side double-density floppy. Osborne filed for Chapter II bankruptcy protection and Novell launched Netware for PCs.

In **October** IBM introduced the $9,000 8088-based XT Model 370 with 768Kb RAM and a 10Mb drive. And in Britain, Apricot offered its 5MHz 8086-based ACT.

In **November** SSI shipped WordPerfect 3.0 and IBM launched its buggy PCjr, starting at $700.

Microsoft released Word 1.0 but failed to interest IBM with its yet-to-be-launched Windows. IBM was working on a DOS multitasker called TopView. In the event, Digital Research beat both to the market with GEM.

In truth, an effective GUI needed more power than was available, but it was clearly going to come. Philips and Sony backed their faith by beginning development of the CD-ROM.

PCs go soft and GUI

Retrobytes

- A 10MHz Intel 8286 processed 1.5MIPS.
- £1,500 got you 30 ZX81s.
- Compaq took a record $329 in its second year.
- An ACT Apricot with floppy drive, 256Kb RAM and Epson RX80 printer cost £1,800 (inc VAT).
- Microsoft had revenues of $50m and 476 staff.
- Intel made $116m on an income of £1.2 billion.
- IBM made $5,4 billion on revenues of $40 billion.

Commodore 64 hits shops and attracts worldwide acclaim

"Home computer or small business system?" was the question we asked of the Commodore 64 in May 1983. Originally costing £344.95, the 64 found itself pitted against the likes of the BBC Micro, leaving the ZX Spectrum catering for entry-level computing. With a decent keyboard occupying almost its entire surface, the 64 more than physically resembled Commodore's earlier VIC 20. Under the lid however beat the heart of a 6510A (a 6502 development) processor, accompanied by 64Kb RAM and a rather spectacular sound chip named SID. It may have had business aspirations, but with the SID chip driven by superb musicians such as Rob Hubbard, and sprite graphics capability, the 64 became the games computer to own. As its price dropped, the 64 ended up being one of the bestselling home computers in the world.

The tower of Lisa is leaning towards the success of the Mac

Most agree that Xerox's advanced research labs in the late seventies/ early eighties were responsible for the first GUI, but it never carried it through into a viable commercial product: a fully equipped Xerox Parc Star system came in at around $50,000. For more reasonably priced products you'd have to travel to January 1983, when *PCW* was invited to review two new products based on "the graphics mouse... the vehicle that (will) smoothly usher in the next generation of computer users — keyboard-phobic executives".

One product was VisiOn from VisiCorp (business partner of Dan Bricklin's Software Arts which developed the groundbreaking VisiCalc: see 1979). The other was the Apple Lisa, boasting a much-vaunted 300 man years of development. Compare that with the Apple II's two man years and the Apple III's 25 man years. Lisa stood for quite a mouthful (Locally Integrated Software Architecture) but the whole point was to produce a computer which was easier to use than ever before.

Looking back, the Lisa's operating system clearly shows early inspiration for the forthcoming Mac, with the menu bar at the top, nested folders with draggable contents in moveable windows, and of course the arrow-headed mouse-driven pointer. The Lisa featured a 720 x 364 pixel 12in mono display built into the main unit, a Motorola 68000 processor and 1Mb RAM, but regrettably this innovation would set you back around £7,000 including a printer. It's easy to say that Apple's Mac started the mass acceptance of the GUI in 1984, but technologically the Lisa was there a year earlier.

It's time to play the game — Tolkien brings Bilbo and Gandalf

1983 was a big year for computer games. May's *PCW* alone covered the superb action of Imagine's Arcadia and Melbourne House's Penetrator for the ZX Spectrum. The madness of Automata's Pimania written by Christian Penfold and Mel Croucher baffled UK gamesters searching for the hidden gold and diamond sundial prize allegedly worth £6,000. And those home computer users jealous of Zork on higher-end systems could revel in Melbourne House's The Hobbit, where Bilbo, Thorin and Gandalf explored Tolkien's world, getting frustrated by carefully timed floating barrels and Gollum's invisible-ring antics.

p84 ➢

1984

In **January** the Apple Mac introduced itself, and a new phase of computing, with the words: "I'm glad to be out of that bag".

Also released was the souped-up Lisa 2, the Commodore 264, a $2,900 portable from IBM, and NEC's 8MHz V20 and V30, clones of the Intel 8088 and 8086.

In **March** *PCW* reviewed the SpectraVideo, first to be built to the MSX games-PC spec, backed by Microsoft and top Japanese companies. MSX went the way of many such moves, fragmenting into nothingness.

Future is where it's AT

Another approach came in **April** when *PCW* featured the Adam, which turned the ColecoVsion games module into a personal computer.

In **May** Amstrad made its début in the computer market with the CPC64.

In **June** Sinclair launched the multi-tasking 16/32-bit QL, with two microdrives. It was novel and well received but failed to take off.

But Britain was still at the leading edge. This was the year of the first hand-held Psion Organiser, with a single-line display.

In **August** IBM launched the PC AT (*below*), true precursor of the modern PC, plus its TopView multitasker and the Enhanced Graphics Adapter card and monitor, supporting up to 640 x 350 resolution in 16 colours.

In **October** the internet clocked its 1.000th host. The race was already on for bandwidth: 2400 baud modems were the rage at Comdex in **December.**

Retrobytes

- £1,500 bought you three 2400 baud modems.
- A twin-floppy Apricot.with monitor and daisy-wheel printer cost £2,384.
- An 8088-based IBM PC XT with 768 RAM, 360Kb floppy and 10Mb drive cost $9,000 in the US.
- Microsoft had revenues of $97m and 608 staff.
- Intel made $198m on an income of £1.6 billion.
- IBM made $6.5 billion on revenues of $45.9 billion.

Orwell 'n good

If Apple's advertising campaign of 1984 was anything to go by, the Orwellian nightmare was the conformity of Big Blue's IBM PC. There was now an alternative. Many considered Apple's future to be on the brink after the Apple III and Lisa, but the Mac — a computer for the rest of us — turned the company around.

The original Mac, reviewed in March 1984, was described as using Lisa 32-bit technology. This referred to its relatively quick Motorola 68000 processor running at a fairly nifty 8MHz; this ran in 32-bit internally and 16-bit externally. Compare that to 1983's Lisa running its 32-bit 68000 at around 4MHz, and IBM's Personal Computer employing an Intel 8088 (16-bit internal/8-bit external) running at 4.77MHz.

The original Mac came in an upright 20lb box complete with a monochrome 9in 512 x 342 pixel display, 128Kb RAM and Sony's then revolutionary 3.5in 400Kb floppy drive which was incompatible with Lisa's 5.25in floppies. A basic machine started at $1,995, or around $3,500 fully kitted up, which was still considerably cheaper than the Lisa.

Lisa's Desktop Manager had been refined into the Mac's proprietary Finder Operating System that still forms the basis of modern-day Macs. The "biggest surprise [was] that the Macintosh [was] totally incompatible with the IBM Personal Computer. Moreover, it [didn't] even run stripped-down, revised or enhanced versions of Microsoft's MSDOS Operating System". According to Apple however, over 100 independent software developers were working on products for the Mac. The original system did nonetheless come with the MacWrite word processor and MacPaint, arguably one of the first bitmapped paint packages.

Despite Apple announcing Lisa 2, it also began to develop software to allow the Lisa to emulate the Mac. The fate of Mac's big sister was pretty much sealed, being discontinued a year later. Apple founder and head Steve Jobs described his Mac as: "The fastest and most powerful computer ever placed in the hands of a large number of people". We concluded: "Apple [was] one of the few companies that could take on the IBM/MS-DOS de-facto standard with any chance of winning, and the Mac [was] a terrific weapon with which to enter the battle." We did however argue that some of the graphical-interface features were a little trivial, asking: "How many times can you look at a whimsical icon before you tire of it?"

The Hubot shows that the whole point of having a household robot is to watch TV!

IBM is AT its best with home PC

In August 1984, IBM announced its PC AT system, first equipped with a 6MHz Intel 80286 processor (the first in a product line still supported today), 1.2Mb 5.25in floppy drive and 256Kb RAM: yours for around $4,000, but that didn't include a hard disk or monitor. A more complete system with 20Mb hard disk, colour graphics card and monitor weighed in at around $6,700. The AT did however signal the longterm future of PC hardware, the basics of which still exist for compatibility on even the latest systems.

In the same month, IBM announced the Enhanced Graphics Adapter (EGA), offering up to 640 x 350 pixels in 16 colours. You needed to add a 64Kb memory pack to the standard card however, bringing the total coast of this graphics card to over $700.

Microsoft released MS-DOS 3.0 for PCs, supporting 1.2Mb floppy drives and hard disks larger than 10Mb: ideal for the IBM AT computer.

p87 ➢

1985

The market was hardly wide open but Intel and Microsoft had yet to corner it. There were many other players.

In **January** Atari introduced the 520ST, with 512Kb RAM, 192Kb ROM, colour and MIDI. It became a favourite with musicians.

In **February** *PCW* gave a rave review to Digital Research's GEM GUI. Microsoft released Word 2.0 for DOS.

In **March** IBM abandoned the IBM PCjr and Apple dropped the Lisa. In **May** Apple sacked Steve Jobs, who went on to found NeXT.

In **July** Aldus released PageMaker for the Mac (*see below*), Quarterdeck shipped Desqview 1.0 for task switching within the PC's RAM, still hovering at 512Kb.

Unlikely IT catalyst Alan Sugar, at Amstrad, shipped the PCW "Joyce", first of two seminal launches. It ran CP/M on an old Z80 but was packaged as a word processor complete with printer, all for £399. It attracted many non-techie users.

In **August** Guy Kewney welcomed the Amiga 1000 as giving a "new price level to business computing".

In **October** IBM launched token ring and Intel introduced the 80386. Not to be outdone, Britain's Advanced Risc Machines shipped its first 32-bit Risc chip which débuted in an Acorn accelerator card.

In **November** Microsoft shipped Windows 1.0, two years after its announcement. It made little impact.

Nintendo introduced its games module.

A spoonful of Sugar

Retrobytes

- The new 16mHz 80386 was ten times faster than the first 8086 and at $299, 11 times cheaper per MIP.
- A mono Atari 520 ST and Epson LX-80 printer cost £1,054 (ex VAT).
- £1,500 got you half a Canon Laser-Beam printer.
- Microsoft had revenues of $140m and 910 staff.
- Intel made $1.5m (sic) on an income of £1.6 billion.
- IBM made $3.5 billion on revenues of $26 billion.

A TOS up for Jack's ST

Former founder and boss of Commodore, Jack Tramiel, left to head up Atari at the beginning of 1984. The fruits of his labours arrived in mid 1985 with the Atari ST, complete with Tramiel's catchy slogan "Power without the price". At £749 for a 68000-based machine with 512Kb RAM, 3.5in floppy drive, high-resolution graphics and the GEM graphical user interface, the ST was dubbed a Mac-beater, or the Jackintosh. Proud of his new toy, Jack shamelessly gave his name to the ST's Tramiel Operating System, resulting in a rather unfortunate acronym.

Nonetheless, the ST was a huge success, bought in droves as much by the Mac as the Amiga wannabes. It beat both in one respect beyond price, however: the inspired fitting of a pair of MIDI ports made the ST the music-studio computer of choice for many years, and pretty much launched sequencing outside of dedicated boxes. For most though, the ST was a much-loved games machine.

One month after our review of the Atari ST came the long-anticipated Commodore Amiga, one very excited Guy Kewney and a nine-page review: "It does multitasking. It has colour. It uses a mouse and icons. It's fast, has plenty of memory and uses cheap, large-capacity disks". He was "sure this really [was] the micro [he'd] been waiting two years for the world to produce".

Birth of DTP

Computers thrive on killer applications and the Mac needed only wait one year before its holy grail arrived: and its name was desktop publishing. The Mac's friendly graphical user interface, coupled with Aldus PageMaker and the first affordable PostScript laser printer, heralded the DTP revolution. Indeed, we can thank none other than president and founder of Aldus, Paul Brainerd, for coining the term "desktop publishing". The name Aldus, incidentally, comes from Aldus Manutius, the 15th century printing pioneer whose profile graced PageMaker's opening screen.

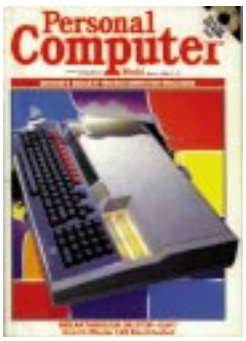
It was years before you could perform serious DTP on a Windows-based PC, by which time the Apple Mac dominated the business. Even today the majority of UK publishers, including those of *PCW*, are still putting their pages together on Macs.

Amiga's game on

At $1,500 the Amiga was at first considered to be more a business machine than one for the home. You got an 8MHz Motorola 68000 processor, 256Kb RAM and three fabulous custom hardware chips (called Paula, Daphne and Agnus) which raced through graphics and sound leaving the main CPU to better things. It featured a colour GUI two years before Apple and could multitask from day one, but with all those cool graphics and audio capabilities and a pair of joystick ports thrown in, what fate befell the Amiga? Yes, you guessed it: despite carving a slight niche in some aspects of video post production, the Amiga fast became the aspirational games machine. Its price never dropped as low as the Atari ST, but the two battled it out for supremacy in the entertainment market for years to come.

p89 ➢

1986



Here began the heyday of DOS PCs, which were finally getting the RAM and power for sophisticated, albeit text-based, software.

Memory-resident (TSR) utilities like Sidekick provided Windows-like pop-up services; must-haves were Norton Utilities (for its Undelete) and Traveling Software's LapLink for swapping files between PCs.

In **January** PC-cloner Compaq announced record $503.9m revenues and Apple launched the 8MHz Macintosh Plus and the LaserWriter Plus. IBM announced the short-lived IBM RT, one of the first 32-bit RISC computers.

Microsoft released DOS 3.2 with support for 3.5in 720Kb floppies. In **March** Microsoft sold its first shares at $21 per share.

In **August** Intel shipped the 32-bit 80386, ramping up the MIPS for the coming graphics revolution. Almost immediately, Compaq shipped 386 PCs (*below*).

In **October** *PCW* enthused over Amstrad's second seminal product, the PC 1512 (*below*), starting at £399 (ex VAT). It opened the UK home market to PCs but at the expense of innovative British companies like Acorn and Apricot.

This was the year Inmos UK pioneered parallel processing with the T800 transputer, NEC launched the multisnyc monitor, Gateway 2000 shipped its first PC, and the Small Computer System Interface (SCSI-1) standard was finalised.

The PC hits UK homes

Retrobytes

- £1,500 bought you 2.75Mb of RAM in the form of 256Kb chips.
- A colour Amstrad 1512 with 10Mb disk and Epson NLQ LX86 dot-matrix cost £1,236 (inc VAT).
- Microsoft had revenues of $197m and 1,153 staff.
- Intel *lost* $178m on a £1.26 billion income after demand slumped as expensive new fabs opened.
- IBM made $4.7 billion on revenues of $51billion.

Self-confessed rip-off

In October 1986, Guy Kewney described Amstrad's PC1512 as "probably the most important British micro to appear this year". The PC1512 was codenamed AIRO, an acronym invented by Amstrad boss Alan Sugar himself, meaning Amstrad IBM Rip-Off.

The 1512's big problem was an inability to use high-resolution EGA-enhanced graphics adapter cards. This may have been a problem for some, but most important was the price: £399 (ex VAT) meant that "many people who always wanted a PC [could] now afford a very nice one".

Your money got you an Intel 8086 processor running at 8MHz (switchable to 4.77MHz), 512Kb RAM and a 5.25in 360Kb floppy drive; MS-DOS 3.2 was included, as was a monitor and keyboard. Strangely, the monitor powered the system, and the keyboard used a non-standard plug. This limited expansion possibilities, but at £399 for a basic PC clone, we said: "What more could you want?"

Compaq on the desk

Towards the end of 1986, Intel officially announced its true 32-bit 80386 processor, and hot on its heels was Compaq's DeskPro 386: our first official 386 review written by Peter Jackson in November's issue. "As the leader in the IBM compatible market, it was obvious Compaq would build a 386 machine, but at the same time Compaq does not have the muscle to impose brand new standards on the business micro world." The problem was the "absence of any 32-bit product line or statement from IBM", forcing Compaq to "tread a narrow path".

"On the one hand, sticking to the old (IBM/Microsoft PC-DOS 1981) standard at the expense of performance would waste the potential of the chip. On the other, unleashing the full power of the 32-bit processor would mean a proprietary machine with no software available, and no guarantee that IBM would decide to become Compaq compatible when it launched its own range of 32-bit systems."

The design of the DeskPro 386 was the result of walking such a tightrope, and indeed ended up setting the standard for PCs for years to come. For example, the DeskPro's powerful 16MHz 32-bit 80386 processor acted like an 80286 when first started up.

"First the 80386 mimics the 80286 protected mode features, including the protection itself and the 16-bit instruction set. On top of that sit the specific 80386 features that give the chip its real power," such as direct addressing of 4Gb RAM, memory paging and the full 32-bit instruction set. "Most important for the future though is [what] the 80386 called virtual mode", allowing real mode programs written for the 80286 to be run in separated protected areas of memory. We eagerly awaited a "protected mode" operating system to arrive, exploiting the chip's potential — it was hoped that Microsoft's long-awaited MS-DOS 5 would do the trick.

The style of the DeskPro signalled the shape of things to come

Jackson summed up the DeskPro's architecture and in hindsight described many PCs to come: "The DeskPro 386 [was] split into two functionally separate parts. On one side of an invisible divide is the 16MHz processor and its 32-bit slotted RAM; on the other is an 8MHz AT clone." He concluded: "If it gets a real operating system and drops all this 640Kb RAM barrier, the DeskPro 386 should give any new IBM PC a run for its money." Sadly, we'd have to wait a few years yet.

Described as "aggressively priced", a standard DeskPro 386 with 16MHz 80386 processor, 1Mb RAM, one 1.2Mb floppy and a 40Mb "Winchester" hard disk cost £5,399 minus monitor. Just over £2,000 extra got you a 130Mb hard disk, while a 4Mb to 8Mb RAM expansion came in at £2,695. A relatively good buy at £695 got you an intelligent 40Mb tape streamer.

p92 ➢

1987

A vintage year for products, and one in which IBM found it had lost control of the PC.

In **March** US Robotics unveiled the 9.6Kbps Courier HST modem. And Sinclair's Cambridge Computing launched his final classic — the £200 Z88, a mobile which has yet to be bettered at the price.

In **April** (*left*) *PCW* tested the 68020 Mac II, the first with colour, a separate monitor and slots for PC-style add-on cards … and plug-and-play, which Windows would not get until 95.

IBM launched the PS/2 range with two important innovations: VGA, giving 16 colours at 640 x 480; and Micro Channel Architecture, a sensible but doomed attempt to upgrade the PC.

Microsoft announced Windows 2.0 and IBM shipped TopView, only to drop it in weeks. Apple created Claris to sell some software.

In **August** came the second UK classic of the year: Acorn's Archimedes, driven by an ARM Risc chip and doomed like many non-PCs to be squeezed into a niche.

In **October** we reported the battle of the Sega Master, the Nintendo and Atari 65XE games consoles.

In **November** Borland shipped its Quattro spreadsheet, whose 1-2-3 emulation resulted in a nine-year legal battle with Lotus.

In **December,** the millionth copy of Windows was sold, despite a lack of applications. And Microsoft and IBM both shipped OS/2.

IBM loses its control

Retrobytes

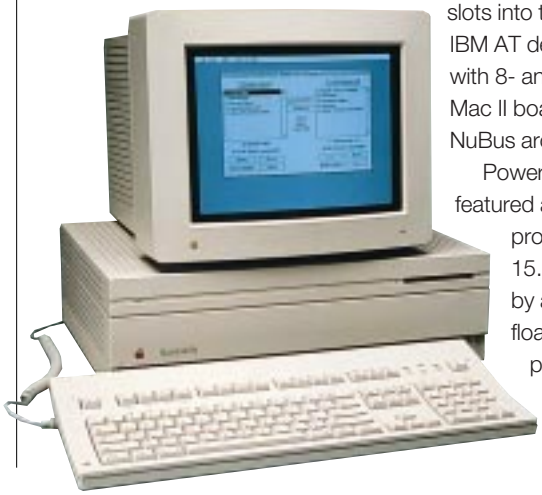
- A 20MHz 80386 processed 7MIPS.
- £1,500 bought four 20Mb Winchester hard drives.
- Digitask sold 386-based systems from £2,600.
- Compaq posted $1.2 billion sales: the fastest growth ever from start-up.
- Microsoft had revenues of $346m and 1816 staff.
- Intel made $248m on an income of £1.9 billion.
- IBM made $5.2 billion on revenues of $54.2 billion.

DTP matures

1987 was a great year for DTP, with the first releases of Ventura and Quark XPress, and PageMaker becoming increasingly mature. The Atari ST joined in too, with a DTP bundle consisting of one of the first cheap laser printers driven by the new Mega ST models. Atari was also one of the first out with a CD drive, the CD-001 costing £399. The McEmulator, said to turn your ST into a Mac clone for £150, while being great fun didn't fare so well.

The return of the Mac

The original 1984 Mac was an undeniably impressive machine with an operating system which continues to influence developers to this day. The only trouble was that it wasn't taken seriously as a business computer, not like an IBM or compatible system.



Apple's Macintosh II, reviewed in April 1987's *PCW*, changed all that. It was the first Mac to break away from the all-in-one design, instead favouring the separate monitor and main system box of, how shall we say, more serious computers. This gave Apple a great opportunity for expansion, sensibly fitting six slots into the Mac II. While the IBM AT design was struggling with 8- and 16-bit slots, the Mac II boasted Apple's 32-bit NuBus architecture.

Power-wise, the Mac II featured a Motorola 68020 processor running at 15.6MHz, accompanied by a Motorola 68881 floating point co-processor. It was the first Mac to offer a built-in SCSI interface as standard, which did no harm when you wanted to easily fit additional drives, scanners and the like.

The Mac II was also the first colour Mac and Apple had already done its homework, offering a small but perfectly formed rebadged 13in Sony Trinitron monitor, driven at a considerably less flickery 66.7Hz than the average 60Hz of the competition. The Mac operating system at 640 x 480 pixels in 256 colours had never looked so good. 1Mb of RAM came standard, expandable to 8Mb, and you had the choice of a 20, 40 or 80Mb SCSI hard disk. The 40Mb version came in at around £5,500.

PCW said the Mac II "marks Apple's entry into the realm of serious computing", and concluded that "you can disagree with any number of individual design details on the Mac II, but you can't call it a toy".

Archie colours up and speeds up

"Is this the world's fastest micro?" we asked of the new Acorn Archimedes in August 1987. Our reviewer, Dick Pountain, was smitten: "The A500 felt like the fastest computer [he'd] ever used by a considerable margin; just about everything you [did] happen[ed] instantaneously." This power came from Acorn's ARM (advanced RISC machines) technology which produced a 32-bit Reduced Instruction Set Computer (RISC) chip, resulting in four MIPS from a relatively modest 4MHz clock speed.

The Archimedes, or A series, came in two flavours: the A300 series were replacements for the BBC Micro and Master, indeed wearing the BBC badge, while the A400 series, badged by Acorn, was more upmarket, featuring hard disks, memory and greater expansion capabilities.

The basic A305 with 512Kb RAM cost £799, while an A440 with 4Mb RAM and 20Mb hard disk would set you back £2,299. A colour monitor cost £200. And you'd want colour, too, as the Archie raced through graphics and was demonstrated drawing swift mandelbrot sets or playing the excellent 3D Lander game.

1988

Four years after the Mac demonstrated the power of the GUI, PCs were still predominantly running under text-based DOS (to be fair, it was far easier for Apple to innovate within its narrower base of users and hardware).

In **March** it sued Microsoft and Hewlett-Packard, claiming their GUIs (HP had one called NewWave) infringed its copyright: cheeky, considering Apple copied the Mac's from Xerox.

The PC meanwhile was creeping up to the price-performance needed for a mass Windows market. In

Dossers still dominate

June Intel launched the SX, a 386 with a 16-bit data bus to fit cheaper motherboards.

In **September** IBM launched a new PS/2 using the AT (to become known as the ISA) bus rather than its new MCA bus, while 61 companies backed the rival Extended Industry Standard Architecture (EISA).

Compaq introduced its first VGA laptop, using a 12MHz 286 and a 10in greyscale display.

In October Ashton-Tate released dBase IV for DOS and Steve Jobs unveiled the sensation of year, the NeXT computer, a stylish black cube running the remarkable NeXTStep OS.

In **November** came the Ami word processor for Windows, and Aldus was reported to have scrapped a similar project after being given a preview of Microsoft Word for Windows.

Spectrum Holobyte sold Tetris — the first game to be imported from Russia.

Retrobytes

- A 16MHz 386SX cost $40 less at $165 than the 386 but nearly twice as much in cost per MIP.
- £1,500 (ex VAT) got you a 286-based Brother BC-20 PC and an HP DeskJet.
- A 16MHz portable mono Mac cost £4,500.
- Microsoft had revenues of $591m and 2,783 staff.
- Intel made $453m on an income of £2.87 billion.
- IBM made $5.8 billion on revenues of $60 billion.

History of OS/2

IBM and Microsoft shipped OS/2 1.1 with the Presentation Manager GUI in November 1988. Bill Gates said: "During the next ten years, millions of programmers and users will utilise this system."

In January 1983 Microsoft began work on a multitasking DOS which led to OS/2. IBM had a project led by Ed Lacobucci who later developed the Citrix technology upon which Microsoft Windows Terminal Server (Hydra), due for release this summer, is based. In 1985 IBM and Microsoft pooled their efforts but it was a team in name only. Microsoft wanted the GUI to be Windows, IBM wanted the Presentation Manager from Hursley, UK. Nathan Mhyrvold, Microsoft's chief technology officer, originally joined Microsoft to resolve this battle.

OS/2 was announced in April 1987. It shipped late, in December 1987, without the GUI and with limited printer support. Relations between IBM and Microsoft didn't improve. Microsoft's involvement ceased in 1990 with OS/2 1.3, still the leanest, fastest NOS kernel today. MS spurned OS/2 for Windows NT in 1990 but the break wasn't concluded until 1992 after IBM shipped OS/2 2.0. Bill Gates said he would support OS/2 2.0 if it sold a million copies. It did. He didn't.

The NeXT best thing for Jobs

December 1988's *PCW*: "When Steve Jobs left Apple three years ago and announced he was going to build the NeXT thing in computers, he wasn't given much chance to succeed. But the (Unix-based) NeXT computer system is finally here. However, it took so long to arrive that several other companies, notably Sun and Apollo (the latter taken over by HP in mid 1989) got well ahead in the field."

The NeXT was a striking computer in every respect. On the outside, the one-foot magnesium cube housing the system, the 17in 1,120 x 832 pixel display, the keyboard, mouse and even optional 400dpi laser printer were all finished in a very stylish black.

The inside of the cube was equally impressive. At its heart beat three Motorola processors clocked at 25MHz: the main 68030 backed up by a 68882 numerical co-processor and an impressive 56001 digital signal processor (DSP). Much of the NeXT's blistering performance was due to a custom Integrated Channel Processor chip featuring no less than 12 Direct Memory Access (DMA) channels used to move data without interrupting the main 68030 processor. Compare that to five DMA channels on a nineties PC.

Another custom chip looked after a then-revolutionary 256Mb rewritable optical drive, a Canon device which used 5in disks fitted into cartridges; an optional 330Mb or 660Mb Winchester hard disk could be fitted. 8Mb RAM was standard, expandable to 16Mb.

The next step for Jobs after Apple was, in fact, NeXT

The software was even more impressive than the hardware, based on the Mach operating system, a variety of Unix developed at the University of California, Berkeley. On top of the basic OS lay the NeXTStep system software. One impressive aspect of NeXTStep was its use of display PostScript, developed in conjunction with Adobe, and boasting a "lightening fast and very powerful graphical user interface". It also allowed the laser printer to be a very simple device.

When we first looked at the NeXT, it could only be purchased by US academic institutions. Significant quantities didn't arrive until around six months after its first launch, and the poor old UK had to wait a further 12 months before we got a go. The NeXT's official UK launch came in February 1990, and a version of the OS for Intel processors came shortly afterwards. Steve Jobs returned to Apple in 1997 along with his NeXTStep operating system, which is likely to form the basis of Apple's forthcoming Rhapsody industrial-strength alternative to MacOS.

p94 ➢

1989

This was the year of the portable, and not only because it saw the start of the PC Memory Card International Association (PCMCIA) to develop what would become the PC Card notebook slot.

In **January** Microsoft released Quick Pascal, to vie with Borland's excellent Turbo Pascal. Apple launched its most powerful Macs yet, the SE range.

In **April** Intel launched the chip that was to be the making of Windows: the 486, essentially a 386 with a built-in maths co-processor.

In **June** Apricot scooped the world with the first 486 PC, costing $18,000. The next month *PCW* reviewed IBM's alleged portable, the P70, which weighed 20lb.

August saw the advent of one of the first useful palmtops, the DOS-based Dip (sold by Atari as the Portfolio). Apple showed its portable Mac in **October.**

In **November** Psion launched its MC range, a radical attempt at true mobiles (light and easy for both input and access of data). They lacked good screens and cost too much. Worse, they turned Psion against the format.

In **November** at Comdex Microsoft endorsed OS/2 and IBM backed Windows, a sure sign they were parting ways. WordPerfect was at the peak of its success at version 5.1. Microsoft shipped Word for Windows 1.0.

In **December** Lotus shipped Notes and *PCW* splashed Atari's new Stacy "portable". It weighed 9kg.

The PC gets portable

Retrobytes

- A 25MHz 486 cost $950 at launch: five times as much as a 386, but about the same cost per MIP.
- £1,500 (ex VAT) got you three 2Mb RAM cards.
- An Amstrad PPC 640S portable PC with 2400 baud modem cost £524.
- Microsoft had revenues of $804m and 4,037 staff.
- Intel made $391m on an income of £3.1 billion.
- IBM made $3.76 billion on revenues of $63 billion.

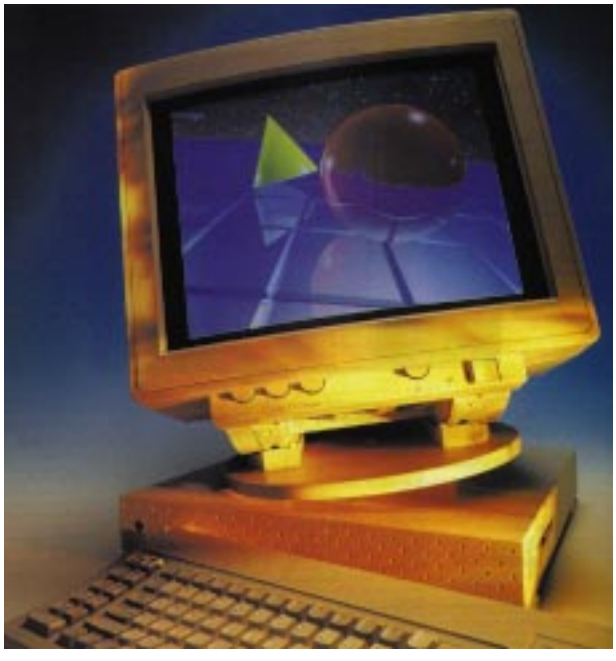
SPARCs of inspiration start to fly

In June 1989 we commented that "as the high-end PC world tends more and more to have the flavour of workstations, so workstation manufacturers are styling their "low-end" machines to tempt the top of the PC and Mac markets". One such workstation manufacturer was Sun, which promised a "welcome to the new world" in the publicity for the launch of its SPARCstation 1.

The SPARCstation departed from traditional workstation design, instead borrowing much from PCs at the time in terms of slimline case styling and mass-production manufacture. The whole point was to produce true workstation performance at prices competitive with high-end PCs and Macs. The SPARCstation was designed to run Unix with a graphical interface. While this was incompatible with MS-DOS, we argued that the jump to Unix (in order to gain higher performance, multitasking and better hardware support) was no bigger a jump than that to OS/2, itself then lacking significant market penetration.

The SPARCstation 1 was built around an LSI-built SPARC RISC processor running at 20MHz, accompanied by a customised Weitek 3167 co-processor, 8Mb RAM (then expandable to 16Mb), a single 3.5in 1.44Mb floppy drive and the choice of one or two 104Mb SCSI-II hard drives. The display ran at 1,152 x 900 pixels in 256 colours or shades of grey, with the option of 16, 17 or 19in monitors. Ethernet, SCSI-II and audio were standard.

A hard-diskless system with 17in greyscale monitor cost £7,400, while one with 104Mb hard drive, a 16in colour display and GX graphics accelerator weighed in at £16,400. The SPARCstation 1 and other workstations never took over the mass market but, like Silicon Graphics machines, made friends in scientific and post-production special-effects facilities.



The SPARCstation was a new start in workstation design

PCW says 486 is 'evolution in action'

IBM was the first manufacturer to produce a machine fired by Intel's brand-new 80486 processor, which Peter Jackson took apart in September 1989's *PCW*.

"The 80486 [comprised] more than one million transistors, linked together to form on-chip functional equivalents for three previously discrete chips: the 80386 basic processor, the 80387 match co-processor, and the 82385 cache controller with 8Kb of mixed data and instruction cache memory.

"In other words, add some main memory and some input and output hardware, and the 80486 on its own can form the heart of a system with all the features of today's top 80386-based PCs." We concluded: "The 80486 [was] not revolutionary. It [was] simply evolution in action; the 80386 has had its day and is on its way down, while a superior version that can do more has just arrived and can only become cheaper and more prevalent. The old chip is dead but just doesn't know it yet." The 386 would know it soon enough however, with its exit to be hastened by the power-hungry Windows 3.0 just around the corner.

In the meantime, IBM's Model 70-A21 Power Platform with the first 25MHz 80486, 8Mb RAM, 120Mb ESDI hard disk, VGA graphics and monitor, and ill-fated MCA expansion slots, cost around £3,000.

p96 ➢

1990

PCs get the picture

The PC was at last ready for a graphical interface, with entry-level systems (just about) able to run one.

Rising PC power had hit the lucrative mainframe business, forcing mighty IBM to retrench with many layoffs. Unix vendors pushed vainly downmarket.

In a Cerne particle-physics lab, a British coder called Tim Berners-Lee drew up the first spec for the World Wide Web.

In **January** we pitted the new EISA bus against IBM's MCA (*see 1987*). But the real contest was one of market strength between IBM and the cloners. IBM lost.

In **April** *PCW* splashed IBM's RS/6000 mid-range box. Its success did not stop the march of the PC.

In **May**, as Intel introduced the 33MHz 486, Microsoft launched a new era with Windows 3.0. And Xerox lost its suit over Apple's use of its windowing GUI.

CP/M pioneer Digital Research, soon to be bought by Novell, valiantly launched DR-DOS 5.0, its rival to MS-DOS. And federal anti-trust officials began an investigating Microsoft.

In **September** IBM and Microsoft finally agreed to part ways: IBM to go the way of OS/2, Microsoft to rule desktops with Windows.

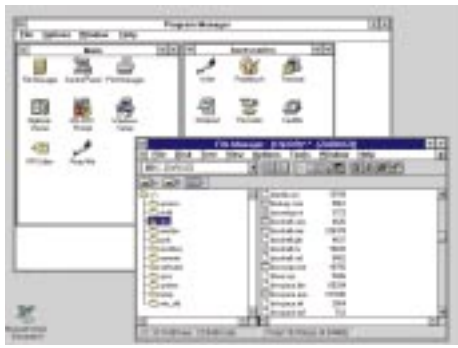
In **November** a10MHz 286 processor, 2Mb RAM and a 30Mb drive were specified as minimum for a multimedia PC. Back in the real world, Microsoft shipped the first Object Linking and Embedding (OLE) library.

Retrobytes

- A 1.44Mb floppy drive cost £97.
- £1,500 got you a 20MHz 386 Bravo PC with a 20Mb disk and 14in colour display.
- An HP LaserJet IID printer cost £1,835.
- Microsoft had $1.18 billion revenue and 5,635 staff. It spent $3m on the Windows launch.
- Intel made $650m on £3.9 billion revenue.
- IBM made $6.2 billion on revenues of $67 billion.

When I'm using Windows

In July's issue, then-editor Guy Swarbrick checked out Windows 3.0. "Apple may have been the first company to successfully produce a GUI as a commercial product, but it wasn't long before the PC-based imitations began to appear. Microsoft's Windows was a different type of program altogether. Using the term GUI [was] stretching things more than a little. Windows was a text-based file manager that just happened to run in graphics mode and use a mouse. Until recently Windows [had] suffered, not only from being awkward to use, but from having few applications available for it that were capable of luring users away from DOS. Windows 3.0 should answer both these criticisms as well as providing a useful increase in speed and the ability to multitask both Windows and DOS apps."



The familiar face of Windows 3.1 tweaked the styling of Windows 3.0's icons

The Program Manager allowed you to sort your applications into customisable groups. The File Manager had been radically upgraded, no longer requiring keyboard intervention to copy, move or delete files. "Perhaps the most important feature of Windows 3.0 [was] its ability to multitask existing DOS apps on a 386 and to do so in a window."

Swarbrick concluded that Windows 3.0 did "everything GEM does and for the most part, it does it better. Windows 3.0 may even be the program to make OS/2 a success at last. Once hooked on Windows 3.0, I suspect the reliance on traditional DOS programs will gradually fade, and when everything is done under Windows anyway, the transition to OS/2 should be relatively painless.

"Windows' success depends largely on Microsoft's marketing. If the company can forget the pretence that DOS 4 is a friendly OS and sell Windows 3.0 to OEMs as the standard OS for 286, 386 and 486 PCs, it may yet fend off the Unix challenge." Microsoft clearly did its marketing right, and with the release of Windows 3.1 two years later, its OS became the dominant force it is today.

On the buses

You wait ages for a bus to come along, then two arrive at once. Well, almost. In January 1990, Peter Jackson continued to report on the impending high-speed bus war between IBM's MCA and the "gang-of nine" clone-makers who produced the Extended Industry Standard Architecture, EISA.

We managed to get a peek at the first EISA machine, but they were certainly in the minority. Jackson concluded: "With 3.5 million MCA machines already in use and no EISA machines yet shipped, IBM need not panic yet. It must do more talking, and more convincing talking, to gather more MCA believers before the EISA evangelists do any more damage."

No amount of evangelising could halt the power of Intel which came along a few years later with its PCI bus, banishing EISA, MCA and VESA's VL local bus to the depot in the sky.

1990 was arguably the year multimedia begun with a vengeance. We take it for granted on today's PCs but back then the arrival of CD-ROM drives and sound facilities was monumental. There were a few ill-fated crossbreeds such as Commodore's CDTV and Philips CDi, but multimedia was definitely here to stay.

p100 ➢

1991

Applications began to catch up with the GUI boom, with Windows versions of Word, Excel, PageMaker and CorelDraw. AMD put pressure on Intel with cheap 20MHz and 40MHz 386 clones.

In **April** Intel introduced the 20MHz 486SX and Apple released its System 7.0 operating system. This was no threat to Windows 3.0, which by **May** (when Microsoft announced Visual Basic) had sold three million copies.

In **June** Microsoft shipped MS-DOS 5.0, finally replacing its ludicrous Edlin editor and adding an overdue Undelete. It also (prematurely) announced NT.

In **July** Borland bought dBase owner Ashton-Tate, starting a fatally long haul to develop a Windows version.

August saw a lifting of a ban on business use of the internet. **September** saw the first Psion 3 palmtop.

Motorola, Apple and IBM formed an alliance to build a flexible platform around the PowerPC chip.

In **October** Apple unveiled a range of PowerBooks and Quadras. In **December** we previewed Win 3.1 with praise but it was essentially a streamlined bug-fix.

Prices were falling. Early in the year we splashed two "cheap" 486 PCs (*left*). Each cost around £4,000. In December you could get a 486 for less than £2,000.

Sound cards were improving: Ad Lib announced its Gold series and Creative Labs introduced the first PC stereo model, the SoundBlaster Pro Deluxe.

The first of the clones

Retrobytes

- A 50MHz 486 cost $644. 100 times faster than an 8086, it was 36 times cheaper per MIP.
- ZDS's MasterSport 386 SX notebook cost £3,695.
- £1,500 got you a 33MHz 386 PC with a 44Mb disk and 2Mb RAM.
- Microsoft had $1.8 billion revenue and 8,226 staff.
- Intel made $818m on an income of £4.8 billion.
- IBM *lost* $2.8 billion on revenues of $65 billion.

All the signs point to the Psion

PCW saw the potential of the Psion early on. As we said: "The Series 3 is the latest attempt to create a mass-market handheld computer and it should be the most successful." And it was, at least until the Psion 3a came out two years later. The original Psion 3 ran on an NEC V30H processor running at 3.84MHz, which put it on a par with desktop machines 15 years before.

The Psion 5, by the way, runs at a comparatively mighty 18MHz. The Psion 3 had all the software you would expect to find on a palmtop: word processor, spreadsheet, calendar, database, alarms and, of course, a calculator.

The price depended on how much memory you wanted. The 128Kb version was £170, going up to £212.72 for the 256Kb version.

Creative use of sound

The trend toward convergence of your home entertainment appliances with your PC can be traced back to 1991. Creative Labs was the first company to bring out a stereo PC sound card, the SoundBlaster Pro Deluxe, and has since continued to set the standard by which all other sound cards would be judged. Not that sound on a PC was a new thing. Steve Wozniak decided in 1977, when first designing the Apple II, that his machines had to have sound, but up to this point the sound on games was limited to the odd pip and you would not have listened to CDs on your PC. The 16-bit version came in 1993 and with proper OS support, multimedia slowly started to take off.

p102 ➢

All at odds with DOS 5 and System 7

Microsoft had messed up with the release of MS-DOS 4 and was not about to repeat the failure. It put out 7,000 beta copies for full testing and sat on the launch until content it was stable.

DOS 5 was optimised to run Windows 3.0 and Windows 3.1 faster, although Windows 3.1 was still two years off delivery. It was also meant to be more memory efficient, running from high memory and allowing you to load drivers in high memory. It came with a full-screen editor, undelete and unformat utilties, and task swapping. GW-Basic was replaced by Qbasic, based on Microsoft's QuickBASIC.

Microsoft was bullish about the future of DOS. Vice president Brad Silverberg boasted of DOS that it would be "...with us forever. We've learned how passionate people are about DOS." That's a very short forever, no doubt.

In the same year Apple released System 7, which at the time knocked Windows 3.0 into a cocked hat. *PCW* gave it a rave review, concluding: "As it comes out of the box, System 7 is a great acheivement.

"It delivers major user interface, font presentation, file management and networking functions without losing compatibility with old applications."

Apple continued a good year with the release of QuickTime in December.

1992

Psion was not the only company thinking small. In **January** Apple chairman John Sculley, the Newton still a gleam in his eye, coined the term Personal Digital Assistant.

In **February** AMD, after a five-year court battle with Intel, was granted full rights to produce 386 clones.

IBM, despite huge revenues, reported a year-end loss of $564m and was running scared of Windows. In **March** it formed Taligent with Apple to develop a platform-independent operating system; and amid Microsoft-scale hype, it launched OS/2 2.0. Also failing to stem the Windows tide was Quarterdeck with a new DESQview X.

Intel showed the 25MHz 486DX2, running a clock-doubled 50MHz internally.

In **April** Cyrix offered a cheap 25MHz 486 and Microsoft shipped Win 3.1, selling a million in 50 days.

In **June** Intel released the Peripheral Component Interconnect (PCI) local bus for PC systems — a month before the VESA VL-Bus standard. These rival buses were to confuse buyers for a couple of years.

In **October** Microsoft shipped Windows for Workgroups 3.1, dipping its toe into networking. And *PCW* featured its first group test of video accelerator cards.

In **November** Microsoft shipped its Access database for Windows, Digital unveiled its 64-bit 150MHz Alpha, and Intel shipped the 486SL for notebooks.

IBM is on the run

Retrobytes

- A $600 66MHz 486DX2 was 50 times cheaper per MIP than the first 8086.
- £1,500 got you a 50MHz 486 with 4Mb of RAM and a 210Mb hard disk…
- …add £105 to complete your system with a Star dot-matrix printer.
- Microsoft had $2.7bn income and 11,542 staff.
- Intel made $1.1bn on an income of £5.8bn.
- IBM *lost* $4.96bn on revenues of $64.5bn.

A confusion of OSes

In 1992 a plethora of operating systems arrived to confuse the poor user.

First off, in March, IBM released the first GUI version of OS/2 in version 2. Microsoft hit back in April with Windows 3.1 and followed it in October with Windows for Workgroups 3.1 with networking functionality. And we had a sneak preview of Windows NT 3.1 beta, renamed by Microsoft from OS/2 version 3.

An object-orientated operating system was a jolt to the system for Windows and DOS users, but that is precisely what they got with OS/2 version 2.

Some things about it were not in doubt. *PCW* declared: "That OS/2 is technically superior to DOS and Windows, is beyond question; the battle is to demonstrate that OS/2 also makes a sound business case." In other words, it lived or died on how applications ran on it.

The results were not particularly impressive. In our 1993 *PCW* Awards it received the dubious distinction of "Turkey of the Year".

Windows 3.1, meanwhile, was a considerable improvement over Windows 3.0. It had drag-and-drop and multimedia capabilities built in, and supported OLE. Most of all it looked very pretty, with icons splattered across the desktop.

Funnily enough, if you tried to migrate from Windows 3.1 to OS/2 version 2, the operation was not entirely successful.

However, it was the second version of Windows for Workgroups, 3.11, released in 1993, with its 32-bit file access, which probably stole the crown as "most useful operating system" because it proved to be a significant improvement for business users.

Alpha better

Since its release in February, the Alpha has always been significantly faster than any chip produced by the opposition: the latest Alpha runs at a blistering 700MHz. The first incarnation, the 21064, clocked on at 200MHz. The fastest Intel chip at the time, the 80386SL, sauntered along at a leisurely 25MHz, while MIPS had a 64-bit 100MHz R4000. The Alpha used an open 64-bit architecture, was designed to support multiple operating systems and to have a 25-year life span. Intel decided early on not to license the Alpha technology, although six years later with a confusing array of deals between Intel, Compaq, Samsung and Digital itself, Intel will now be manufacturing the Alpha under a cross-licensing agreement with Digital.

CD-i slipper didn't fit

Having announced CD-i as a standard the previous year, 1992 witnessed the first actual hardware and Philips was vaunting it as the product of the decade.

CD-ROM had been a Sleeping Beauty waiting to be awakened by the kiss of low prices while the ability to store movies and multimedia content on it made CD-i appear at first glance like the DVD of its day. But Philips managed to bicker about standards for so long with so many other manufacturers, that CD-i ended up as welcome at the ball as one of the ugly sisters making a pass at Prince Charming.

p104 ➢

1993

IBM, after years of milking the mainframe market, posted a $4.96 billion loss in **January** — the biggest in US history. Stac sued Microsoft over disk-doubler compression in DOS 6.0.

In **February** NeXT dropped its hardware and Apple launched a completely revamped range.

In **March** *Newsprint* reported that a 32-bit version of Windows, codenamed Chicago, would ship in 18 to 24 months. And Amstrad beat Apple to market with a PDA, the PenPad.

The Pentium crawls in

In **April** Motorola shipped the first PowerPC 601. But most eyes were looking to the launch of the long-awaited next-generation Intel chip, although when the Pentium shipped in **June** it was an anti-climax.

A **July** group test revealed that the first 60MHz and 66MHz Pentiums were slower on some counts than fast 486 chips. (Speeds quickly rose as system boards and software were optimised.) Meanwhile, Microsoft shipped Windows NT. In **August** Apple lost its court fight against Windows.

In **September** *PCW* reviewed the Apple Newton.

Momentous events were happening online. A group of US students was working on a graphical browser called Mosaic. As each version was posted at their National Centre for Supercomputing Applications site, it was downloaded by the thousand. The web explosion had begun.

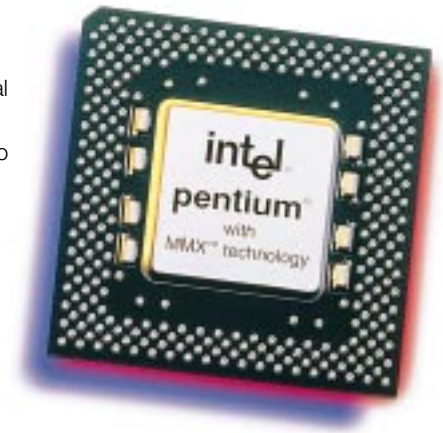
Retrobytes

- The 66MHz Pentium cost 66 times less per MIP than the 8086 and was nearly 200 times faster.
- £1,500 bought you a 33MHz 486 PC with 8Mb of RAM and a 340Mb disk.
- A US Robotics 1.4Kbps fax-modem cost £252.
- Microsoft had $3.75bn revenue and 14,430 staff.
- Intel made $2.3bn on an income of £8.8bn.
- IBM made $8.1bn on $62.7bn income.

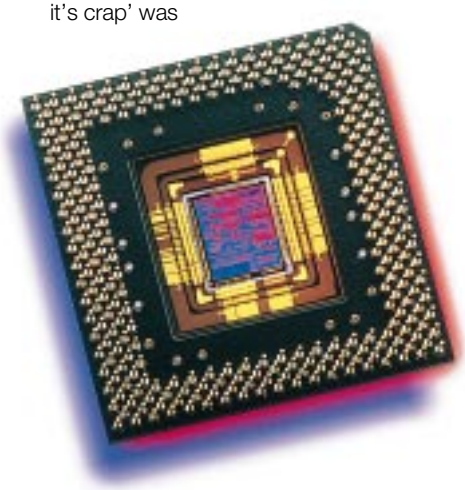
Pouring cold water on Pentiums

Few chips have caused such a stir as the Pentium, and not always for the right reasons. First there was the great legal battle over the name "586". When US courts ruled, Intel did not have sole rights to the tag, leaving rivals like NexGen free to release the Nx586. So, the moniker "Intel Pentium Processor" was born.

Then the original 60 and 66MHz Pentiums were well and truly late. They were announced in March 1993, but even when Intel had launched them they were still largely vapourware and getting hold of one to buy was not easy.



On top of this, there was a heat problem which led to crashes and the inevitable resulting data losses. As *PCW* commented: "In the kind of mission-critical data server applications for which Pentium is targeted, this is a problem." And we went on to rub salt in Intel's wounds on our *ChipChat* page: "And finally, it's a moot point whether or not Intel's new Pentium processor really is as 'hot' as Intel claims. 'It overheats and it's crap' was one *PCW* staff member's interpretation."



Finally, a certain Dr Thomas R Nicely of Lynchburg College, Tennessee, came across a little floating-point bug which bugged the hell out of Intel.

However, Intel, whose profits had passed the billion dollar mark earlier in the year, was quick to recover any lost ground. In October it released the P75 which overcame many of the criticisms levelled at the first Pentiums, helped along by the faster bus speeds of PCI which first appeared in May.

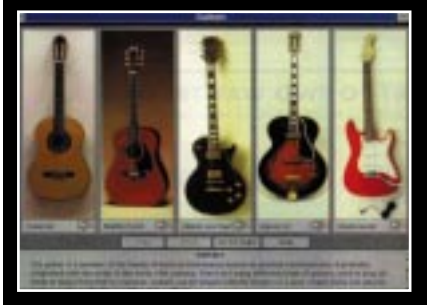
Meanwhile, Intel had started to produce more motherboards. Up until then, the company had regarded this as something of a sideline, but stepped up production to go with the Pentiums, taking a large wedge of the market.

After this, PCs started to look far more like the clones they are supposed to be. In the first Pentium round-up, the *PCW* reviewer complained: "The first three all looked the same, with their clothes off".

Microsoft Access

Microsoft had dabbled with databases for some time. It had licenced R:base and in 1992 bought Foxbase which originally produced FoxPro, and had developed other projects in-house which were shelved before release. The original version of Access came with sBasic prior to moving to the now standard Visual Basic, but it was also compatible with xBase, Paradox, SQL and Btreive data. *PCW* had a few grouches about its structure but the final verdict was that it was a "very solid, very slick and very powerful product".

Encarta, encore!



Microsoft was not the first company to produce a multimedia encyclopaedia and it will not be the last.

From its first version Encarta was a ground-breaking product. As *PCW* said: "Encarta is an exciting and fascinating experience and it's a jolt to realise that this is how reference works will be from now on."

Encarta has since gone on to set the standard for multimedia reference works, and with its Research Organizer, Encarta 98 can even rival Britannica in its usefulness.

1994

PC users began to take processing power for granted. RAM (or rather, RAM prices) and sub-systems such as graphics were major constraints on performance.

The internet, growing exponentially, generated a new fixation: bandwidth.

In **January** Apple showed its first PowerPC product, a Mac upgrade board.

In **February** Windows 3.11 shipped as what was the last big 16-bit upgrade.

In **March** Intel shipped its first clock-tripled 486 chips, perversely called the DX4, clocking 25MHz externally and 75MHz internally. And Apple shipped its first PowerPC-based Macs.

The following month, *PCW* featured the PC600 from Acorn, which had been way ahead of Apple in using Risc chips.

Newsprint reported on a Hayes modem that would run at 28.8Kbps when a standard had been agreed.

In **July** CP/M pioneer Gary Kildall was killed. And Microsoft agreed to change some of its licensing deals to satisfy anti-trust lawyers.

In **August** Marc Andreessen, who led the Mosaic team, joined what was to become Netscape. *PCW* showed a picture of the top-secret P6, successor to the Pentium.

In **September** Kodak showed a digital camera based around a Nikon P90. It cost £8,195.

In **December** *Newsprint* declared: "New free Mosaic wows the web". It was called Netscape Navigator.

Power hits desktops

Retrobytes

- The 100MHz Pentium was 276 times faster than the first 8086.
- £1,500 bought you a 66MHz 486DX2 multimedia PC with 8Mb of RAM and a 540Mb disk…
- …add £500 to get a 90 MHz Pentium equivalent.
- Microsoft had $4.6bn revenue and 17,801 staff.
- Intel made $2.28bn on $11.5bn revenue.
- IBM made $3.2bn on revenues of $64bn.

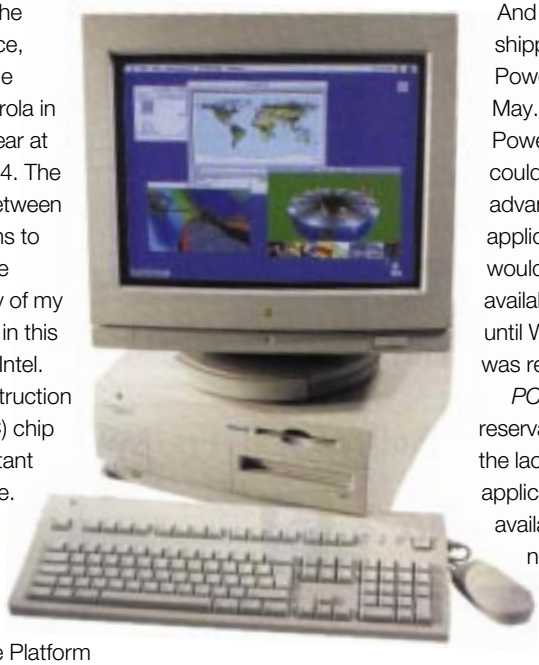
Power PC and Acorn alliance — a safe RISC

The first fruits of the PowerPC Alliance, formed by IBM, Apple Computer and Motorola in 1991, began to appear at the beginning of 1994. The unlikely allegiance between Apple and IBM seems to have arisen out of the principle "The enemy of my enemy is my friend"; in this case, Microsoft and Intel.

The Reduced Instruction Set Computer (RISC) chip was the most important project of the alliance. As part of the RISC project, the group also planned the Common Hardware Reference Platform (CHRP). This was a standard that would allow the CHRP machine to run a number of different operating systems. The three companies hoped not only to challenge Intel's dominance in the processor market but to take on the up-and-coming Microsoft as well.

With the market for Intel's Complex Instruction Set (CISC) chips reaching saturation point, RISC seemed like a good bet. Not only was the PowerPC chip cheaper than Intel's, in many cases it was faster, too. Manufacturers and users alike waxed rhapsodic over the possibility of a computer with this combination of flexibility and compatibility.

In January Apple released its first PowerPC product, a Mac upgrade board.



And it started shipping its PowerMacs in May. With the PowerMac users could take advantage of 32-bit applications, which wouldn't be available for the PC until Windows 95 was released.

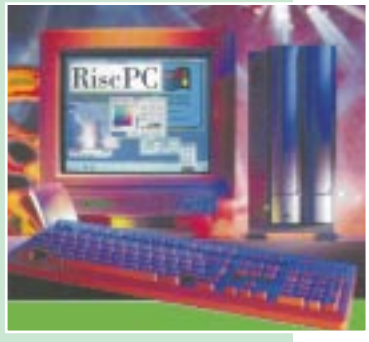
PCW had reservations about the lack of native applications available, but was nevertheless optimistic about the PowerMac's chances: "Once the software is available to take full advantage of the power of the processor, Apple's Macs are primed to take the lead over PCs, not just in ease of use and built-in features but, for the first time, in price and performance, too," it said. It even went so far as to predict that Intel would have to struggle to keep up with PowerMac in the future.

Unfortunately for the alliance, however, Intel was not to be pushed out so easily. Not only did it ramp up its development cycles, it also cut its prices. In 1996 IBM pulled OS/2 out of CHRP and, in '97, Microsoft did the same for NT. IBM admitted that NT implementation had cost the partners US$150m. Netware never even surfaced. With the exception of a couple of IBM network computers and high-end workstations (which run on a version of UNIX), Apple has virtually taken over the PowerPC standard.

With Apple's decision to stop licensing clones (even to Motorola) and the purchase of its biggest competitor, Power Computing, the number of RISC customers is dwindling. At the 1997 MacWorld, a prototype demonstration gave hope that there would be 500MHz PowerMacs by last summer. But Apple didn't order the fast chip and the chip manufacturer went out of business. Motorola and IBM say they still plan to produce PowerPC chips, but some analysts are predicting that Apple will switch to Intel processors by the end of this year.

Acorn ARMs Apple

Cambridge-based Acorn challenged the PowerMac in June '94 with the desktop RISC PC 600, but response was lukewarm. One of the very first companies to use RISC processing, Acorn launched its ARM (Acorn RISC Machine) family way back in 1987. The Archimedes won fierce loyalty from its fans but, due to its price, never became widespread. Acorn is currently an equal partner with Apple in ARM, which now stands for Advanced RISC Machines.



p107 ➢

1995

"Nicely does it" observed *Newsprint* of the general *schadenfreude* as Intel fumbled its response to a furore over a bug in the Pentium, discovered by the improbable Prof Tom Nicely of Lynchburg. It cost Intel $400m.

In **April** *PCW* looked at some of the latest quad-speed CD drives. *Newsprint* reported the early stages of what was to be a running battle for a DVD standard.

In **May** Escom took over 231 high-street stores from Rumbelows. *Newsprint* reported Iomega's new 100Mb Zip superfloppy. In **June** IBM bought Lotus and Sun launched Java.

In **July** Compaq said it would bring out the 120Mb LS120 superfloppy which also read 1.44Mb floppies. The launch of NT 3.51 was overshadowed by the saga of whether Win95 would be delayed by legal action over the bundling of a sign-up for Microsoft's new online service, MSN. Win95 did ship in **August** — to more publicity than any software is likely to get again (*see below*).

MSN, as launched, was perhaps Bill Gates' biggest public mistake. It was not ready, and worse, it was not on the internet.

In **November** *Newsprint* warned of the new macro viruses, Intel released the Pentium Pro and Oracle's Larry Ellison raved about the NC. In **December** we looked at five PC/TVs, reflecting a growing convergence with other technologies.

Win95 raises the stakes

Retrobytes

- A 166MHz Pentium Pro was roughly 600 times faster than an 8086.
- £1500 got you a 75MHz Pentium multimedia PC, 8Mb RAM and a 540Mb hard disk...
- ...add £595 for an HP LaserJet 5P.
- Microsoft had $5.9 billion revenue, 17801 staff.
- Intel made $3.6 billion on an income of £16.2 billion.
- IBM made $5.4 *billion* on revenues of $76 billion.

Windows 95 clearly a kludge

Microsoft spent $200m hyping Windows 95, but no money could have bought the amount of publicity it got. The media, for no very good reason, decided it was a huge story and the launch was splashed everywhere.

This for what was basically a kludge: an operating system designed to run both old 16-bit applications and new 32-bit ones.

Microsoft boasted of a new easy-to-use interface yet it had not resolved a fundamental weakness of Windows 3.x, which offered two frequently conflicting views in the form of Program Manager and File Manager. Windows 95 also had two: Explorer (the equivalent of File Manager) and My Computer which led to a more Mac-like view. Each had its own little ways, where a single, coherent way of working would have been more elegant.

Win95 looked like something designed by a committee, as indeed it had been. Millions were spent on usability labs, focus groups and user surveys to produce an interface on which you pressed the Start button to exit.

Microsoft had been telling journalists for months that Windows 95 needed only 4Mb of RAM. This, it quickly became clear, was less than candid. Win95 needed at least 12Mb, preferably 16Mb, to run faster than Win 3.x, especially with 16-bit applications. So most people needed to upgrade their hardware after installing Windows 95, which caused much resentment.

For all that, Win95 was a major advance and an operating system in itself. It provided better memory management, crash protection, better multitasking and many little usability boosts that are now taken for granted. It introduced plug-and-play, which allowed the operating system to interrogate an add-on device to decide configuration automatically. Remember, Win95 had to be able to talk to just about every device going — unlike the Mac OS which introduced this feature earlier.

Plug-and-play, which relies on device compliance, does not always work but it was clearly the way of the future. If you get irritated with Win95, find a Win 3.x machine and just try installing a new device for it.

"Certainly we want to talk to people who design aeroplanes"

Tim Keating, Intel's European marketing manager, at the height of the Pentium bug furore (*see above*)

Zipping ahead

Win95 also brought home the fact that multimedia and graphical software would require far more storage than that in most PCs of the day, which had 250Mb hard disks.

Disk capacities began to rise rapidly and the cost per megabyte dropped almost in step, but there was a need for an easy way to add random access storage (as opposed to sequential storage such as tape) to existing PCs.

Also, digital pictures and richly-formatted electronic documents became too big for the standard 1.44Mb floppy disk, creating a need for a more capacious transfer medium — what *Newsprint* called the superfloppy.

Iomega's Zip drive was the first low-cost device to answer both these needs. It cost £149, with 100Mb disks costing £13, and it was a sensation. So much so that it knocked Iomega's market-leading arch-rival, Syquest, sideways, even though Syquest quickly brought out the faster EZFlyer.

The Zip still sells well but cannot read or write 1.44Mb disks and so is unlikely to replace the floppy drive. The 120Mb LS-120 drive, which arrived many months after its announcement (*see our timeline, above*) is now made by several companies and is backwards compatible, as is a 200Mb drive Sony displayed at Comdex last year.

p111 ➢

1996

Bill Gates saw the internet light late in 1995 and "turned on a sixpence", as a Microsoftie put it. Massive resources were diverted to net-enable Microsoft products. In **January** he announced his new strategy: MSN was to get netted and he would give away a browser called Internet Explorer.

Meanwhile, chip cloners AMD and NexGen merged and IBM launched OS/2 for the PowerPC.

In **March** Microsoft sold the 30 millionth copy of Win95, and AMD shipped its $75 5K86 processor.

In **April,** ailing Apple appointed Gil Amelio as CEO and licensed the MacOS to Motorola. Netscape shipped Navigator 2.02 in **May**; Microsoft quickly countered with Explorer 2.0.

In **June** Intel shipped the first 200MHz Pentium, Cyrix shipped the P200+ 686 and AMD launched the K5. Nintendo shipped its 64-bit games module.

In **July**, months after having bought into UK high streets, Escom AG went bankrupt.

In **August**, Microsoft released Explorer 3.0 — the third upgrade in a year.

In **September** Motorola launched its StarMax Mac clones and USR announced its x2 modems with a claimed data rate of 56Kbps.

The first Windows CE handhelds appear at Comdex in **November**. And Steve Jobs returned to Apple, which bought his NeXT Software for $424m.

The first of the clones

Retrobytes

- Intel stopped using MIPs to measure processor speed.
- £1,500 got a 200MHz Pentium multimedia PC, 1.6Gb drive,16Mb RAM and a 15in monitor…
- …add £313 for a Canon BJC-610 colour printer
- Microsoft had $8.67bn revenue and 20,511 staff.
- Intel made $5.1bn on an income of £20.8bn.
- IBM made $5.42bn on $75.9bn revenue.

NC vessels and the Java jive

Two related 1995 events had a growing impact in 1996: Sun's launch of Java, and Oracle chief Larry Ellison's promotion of the diskless network computer, running software downloaded as needed from a server.

The network computer (NC) was not new idea. It was virtually identical to what IBM called a thin client and a bare update of the antique "dumb terminal", millions of which were due for replacement.

But Ellison touched some raw nerves. The network computer offered a perfect fit with Java (*see below*) and both were promoted openly as an attack on Microsoft.

The network computer did offer advantages, albeit of a kind more likely to excite the boardroom than the user. IT managers could maintain software centrally on a server, cutting maintenance costs, saving work, increasing security and keeping bolshie users in their place (the PC had caused a shift of political as well as processing power, from the IT department to the desktop).

All of these aspects, lumped under the heading "cost of ownership", had been skimped by Microsoft and Intel in the rush for PC development and have been addressed to the point of tedium by all major suppliers ever since.

In a way, the furore was nonsense. Cut-down PCs could match the advantages of network computers. There was also the equally viable Windows terminal, which exchanged only keypresses and screen draws with an application running on a server.

PC, NC, NetPC or Winterm — which you chose was a matter of horses for courses. But there was a wider significance, hardly touched upon by Ellison. The NC offered a model for web appliances such as smart phones and set-top boxes, and focused minds on the fact that the internet had almost by accident achieved the Holy Grail of computing: an environment independent of hardware and operating system. Any machine could hang off the net so long as it talked TCP/IP.

So, computing no longer needed Microsoft or Intel — it had cut the umbilical. Like IBM, the two companies might get bigger and richer, but they would never again hold the grand sway of their glory days.

Sun's Scott McNealy (above, top) and Oracle's Larry Ellison (above) both saw Java and the NC as a way of getting at Microsoft

Java — percolating

Java overturned the idea that software had to be tailored to its host hardware; instead, a platform is enabled to run Java. This is done by software or firmware called a Java Virtual Machine (JVM), which interprets the code. All browsers now include a JVM.

Java is thus ideal for any network linking dissimilar machines, because it allows the same program to run on any of them. Clearly, too, it is ideal for the NC (*see above*).

The Java language is similar to C++ but is "sandbagged" from activities carrying a security risk, like the ability to wipe a hard disk.

Sun has offered the Java spec as an "open" standard but insists on retaining control of updates. This is opposed by rivals.

Microsoft tried to kill Java with kindness. It claims the best Java development environment and the fastest compiler, yet insists on including Windows-specific extensions which destroy Java's universality.

There are delicate lines to tread in taking Java forward: between power and security, and (in Microsoft's eyes) between what an applet does and what an operating system does.

p113 ➢

1997

Intel launched the Pentium MMX using 57 new instructions. It had a mixed reception, because it rendered out of date all PCs bought in the Christmas rush.

In **February** the first 56K modems appeared. There were four rival specs, none of which gave anything like a 56Kbps throughput.

In **March** Intel previewed its forthcoming Pentium II chip and a German hacker highlighted the danger of Microsoft's downloadable ActiveX controls. And in **May,** AMD's new K6 chip beat the equivalent 200MHz Pentium MMX in tests. Explorer 4.0 was reported to have been delayed by security fears.

In **June** Intel launched the Pentium II at an unprecedented low entry price. And Microsoft posted an early beta of Win98. Promised features include support for the new USB serial port, scheduled to replace the PC's serial and parallel ports. In **August** Psion launched the Series 5 palmtop to compete with CE models. Apple CEO Gil Amelio quit after the firm lost $1.5bn in 18 months.

The main attraction at Comdex in **November** was a new class of mini-notebook. But there were signs of change, including devices using USB and the faster 1394 ports.

In **December**, cheaper ISDN came a step closer with British Telecom trials of a hybrid Home Highway system.

Racing to cyberspace

Retrobytes

- Pentium II speeds rose rapidly beyond 266MHz.
- £1,500 bought you a 200MHz Pentium MMX multimedia PC, 4.3Gb hard drive, 32Mb RAM and a 17in monitor…
- …add £82 for a 56K faxmodem card....
- …add £150 for an HP 670C colour deskjet.
- Microsoft had revenues of $11.35bn.
- (*Intel and IBM results have yet to be announced.*)

Pentium, MMX and the Santa Claus shocker

The year began with much wailing and gnashing of teeth. Thousands of distraught consumers had bought Pentium PCs before Christmas 1996, only for Intel to launch its new MMX chips in January '97. *PCW* noted that "Cannier buyers, who knew the 166MHz and 200MHz MMX Pentium chips were coming, were waiting for old Pentium prices to drop in the hope of picking up bargains." The MMX processors offered around a ten percent speed increase over standard Pentiums, running non-MMX optimised code. Our first MMX PC group test said: "Every single PC in this group test, including the 166MHz Dell, beats the living pants off the fastest machine in last month's top-end 200MHz test [of standard Pentiums]."

Not content with one radical new chip, Intel also launched the Pentium II processor (*pictured, above right*) which moved away from a socket design to Slot One. This new design was not without its problems: "According to our source, the Pentium II processor has been ready for market for months. The only thing holding back its release was the actual mechanical design of the slot…One industry source said that the chips have been known to fall out of the slot in tower models."

Three other chip makers also launched new products in 1997. Cyrix came up with the M2, and little-known Integrated Device Technology introduced the IDT-C6 for the cheap-desktop market. AMD entered the fray with the K6 in 166MHz, 200MHz and 233MHz speeds. We said: "*PCW* tests confirmed AMD claims that the K6 is faster than the latest Pentium MMX…endorsed by Microsoft as fully Windows compatible. It is also cheaper than Intel chips." However, "the K6 is not the PII killer many have said it would be… But the K6 shows its strength for mixed 16- and 32-bit Win95 operating systems, which is where the PII is weak."

Do you want your handheld?

The first Microsoft Windows CE palmtops, announced at Comdex, Las Vegas in late 1996, started to arrive in the UK. The Hewlett-Packard 320LX and the Philips Velo 1 were two of the early contenders, but the small dribble of products on to the UK market failed to make much of a dent. The earth moved for a lot of people when Psion launched the Series 5 in August. Complete with touch-screen and a notebook-like keyboard, the 5 was Psion's attempt to reinforce its status as the big cheese of the PDA world. Another manufacturer, Geofox, announced a handheld based on Psion's EPOC 32 operating system later in the year.

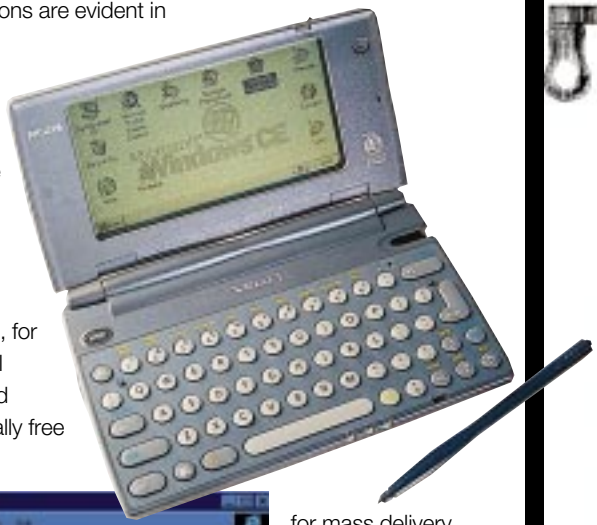
Also at Comdex was the first Zaurus handheld from Sharp, available only in Japan. It had "a 5in, 65,000-colour screen and one model, the Mi-10DC, [came with] a PC card-based digital camera". Various Zauri should finally be on sale in the UK by the time you read this, some 16 months after the Las Vegas launch. It is only now, approaching mid '98, that we are seeing a respectable number of palmtops available on the UK market.

p115 ➢

And so to 1998 and beyond...

Computing in 1998 is beginning a transformation at least as big, but not as clear-cut, as that of a decade ago when it moved from text-based to graphical software.

Major transitions are evident in two imminent Microsoft launches: Windows 98 and NT 5.0. The first prepares PCs for the coming digital broadcasting revolution which, for the first time, will provide unlimited bandwidth virtually free



for mass delivery.

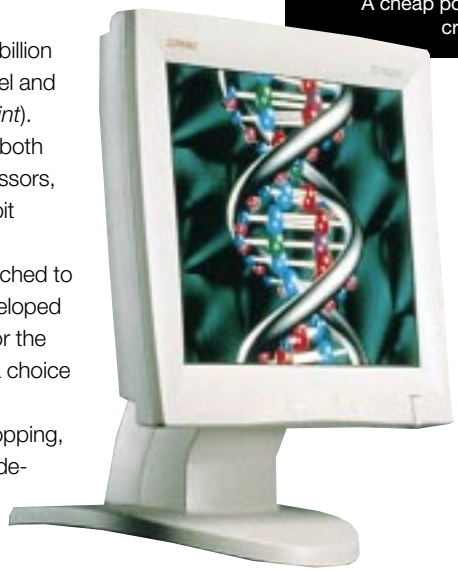
The effects will be huge and unpredictable. Sooner or later there will be a big explosion of "pushed" digital content. Interactivity initially will be by slow modem, but satellite competition will force cable and phone companies into implementing high-speed technologies like cable modems and xDSL.

NT 5.0 is another kind of watershed. Win98, like Win95, straddles old and new technologies. NT 5.0 looks only to thefuture, and it will make a break for the first time from the x86 Intel dynasty that has powered the PC since birth.

Exactly what was behind recent multi-billion dollar deals involving Compaq, Digital, Intel and Microsoft is anyone's guess (see *Newsprint*). But NT 5.0 will be compiled at launch for both 32-bit Intel and 64-bit Digital Alpha processors, and only the latter will be able to use 64-bit addressing.

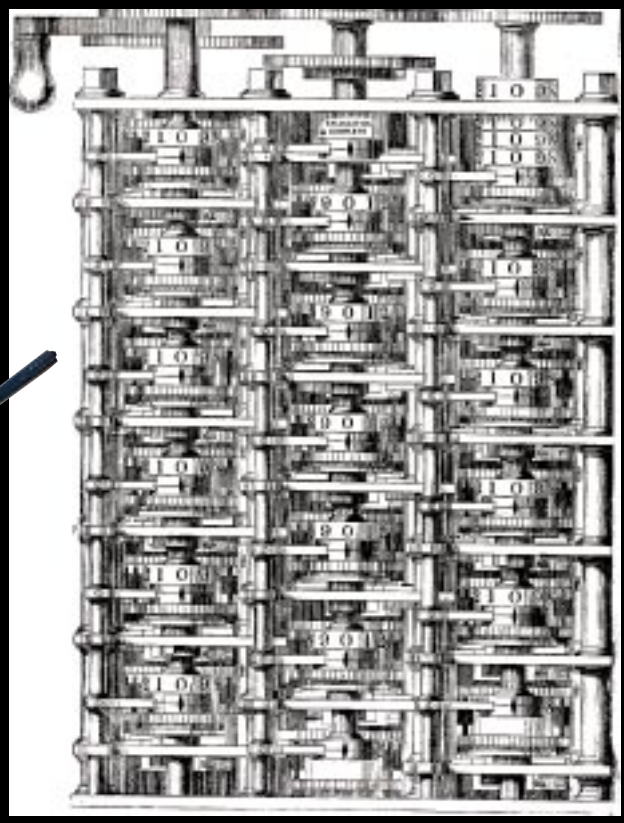
Next year, a fully 64-bit NT will be launched to coincide with the 64-bit Merced chip developed by Intel and HP. It will also be compiled for the Alpha. So, the PC of the future will have a choice of at least two processor ranges.

The price of colour LCD screens is dropping, so they are beginning to chase the cathode-ray tube from desks. Fast USB and 1394 links will shortly do away with the traditional PC serial and parallel ports; they also link the device bays which Intel expects to replace today's expansion slots, to produce a sealed, modular PC.



Above all, the web has spawned a global interface which welcomes any computer that talks its language (*see p111*). Handhelds in particular have introduced a host of new processors and explored new input methods and form factors. The PC is no longer the be-all and end-all of personal computing.

Pause to wave the flag



The computing industry over the past 20 years has been dominated by the US and the Far East, yet the *PCW* archives show how Britain has more than kept its end up, technologically.

Of course, Britain's Charles Babbage (1791-1871) and Alan Turing (1912-1954) have as good a claim as any to have invented the computer. Manchester University put together the first modern computer in 1948 (*see the Michael Hewitt Interview, p186*).

We lacked the gung-ho grassroots entrepreneur culture that was the making of California's Silicon Valley. Yet from the earliest days there were small UK firms putting computers together. Acorn, Psion, Sinclair and even box-shifter Alan Sugar all produced designs of global influence. And there were UK contributions to a host of underlying technologies, from virtual-reality through RISC to ATM.

A cheap point, perhaps, but one worth pondering amid the cramping insecurities of post-Imperial Britain.

p116 ➢

Talking heads

Susan Pederson gets the views of key industry figures on the past 20 years of IT growth.

Lou Gerstner, IBM chairman and CEO

"IT is like electric light, the printing press and manned flight. It's one of those technologies that comes along every century or so and changes things forever.

"Consider that Americans spend more on PCs than TVs. The Ford Taurus [car] contains more computing power than the first lunar landing module. And the chips inside today's Sega video games are more powerful than the supercomputers of 1976.

"Of course, we're now riding the next great technology wave: the rise of powerful global networks like the internet. Something very important is happening here. Networks are collapsing the physical barriers between nations, markets, cultures and people. This connectivity will change everything: the way we access entertainment, replace a lost driver's license, book a seat on an airplane, bank, and interact with one another."

■ *From a speech at Wake Forest University Commencement, 19th May '97*

Chris Bakolas, technical director, Dan Technology

"I've been involved in the IT industry since 1978, starting out in a research and freelance capacity working on Apples and mainframes, not PCs. In those days, if I'd been told that in ten years you could have a PC on your desk which could do everything that one of the big Digital DPIIs could do, I wouldn't have believed it. What drew me to the PC side was the Apple II. It cost more than a Pentium II computer costs today, but it made me love the PC and got me to stay in the industry.

"It was the IBM PC, or rather, its clones which really accelerated the industry. A lot of entrepreneurs saw that they could get the components, put them in a box, and sell it as a PC. Dan started in 1988, bringing in components from Taiwan. After two years, the company decided it could make more money selling a computer than it could selling a video card. The margins were much better, but at that time the PCs were basic: a monitor, motherboard and floppy drive. Now we concentrate more on the quality of our service and support to stand out from the crowd."

Richard Austin, managing director, Evesham Micros

"PCW is only slightly longer in the tooth than Evesham Micros — when I started selling Spectrums in 1983, there were very few generalist computer magazines around. There weren't quite so many computer sellers either! But we've both grown by giving our customers what they want. I wish *PCW* all the best for the next 20 years — I'll be here to cheer you on from my bath chair!"

Andy Grove, CEO, Intel

"Twenty years is too long a time period to make a meaningful prediction in an industry whose history in its present form only goes back ten to 15 years. It is clear to me that computer technology is spreading sideways. What I mean by that is, it is penetrating walks of life where it hadn't been before. And areas in the world where it did not exist before. I think this penetration, this sideways penetration, will continue as far as the eye can see."

■ *From WebChat Broadcasting System, 7th October '97*

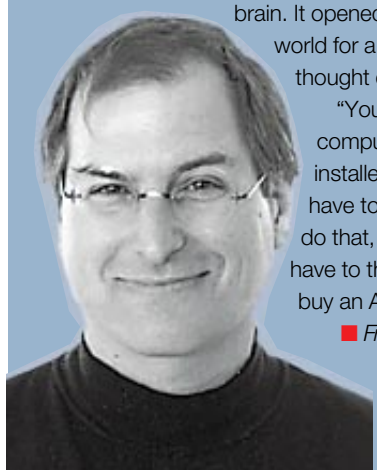
Peter Cochrane, head of applied research and technologies, BT Laboratories

"I was programming in machine code in 1978. Then I was asked to go into architectures for future computers and I thought, we'll be growing them in jam jars in 20 years' time. Well, I overestimated how fast we'd come. But things I never anticipated were the low cost of memory and the switch from coveting memory to simply wasting it. I anticipated their smallness but I don't think I anticipated the cheapness. Even 12 years ago, I could never have foreseen that I would be able to buy a Nintendo for $150 which is more powerful than the old Kray computers. I didn't think the average user would stay with code. I was early into Macs, so the graphical interface was obvious to me. I was struggling with operating systems, but when I got a Mac I was away."

Steve Jobs, interim CEO and co-founder, Apple

"When we shipped the Apple II, you had to think differently about computers. Computers were these things you saw in movies. They weren't these things you have on your desktop. You had to think differently because there wasn't any software at the beginning. You had think differently when a first computer arrived at a school, where there had never been one before. It was an Apple II.

"It was a totally different computer working in a totally different way, using a totally different part of your brain. It opened up the computer world for a lot of people who thought differently.



"You were buying a computer with an installed base of one. You have to think differently to do that, and I think you still have to think differently to buy an Apple computer."

■ *From MacWorld key address, Boston, Mass., 6th August 1997*

Tom Willett, director, Morgan Computers

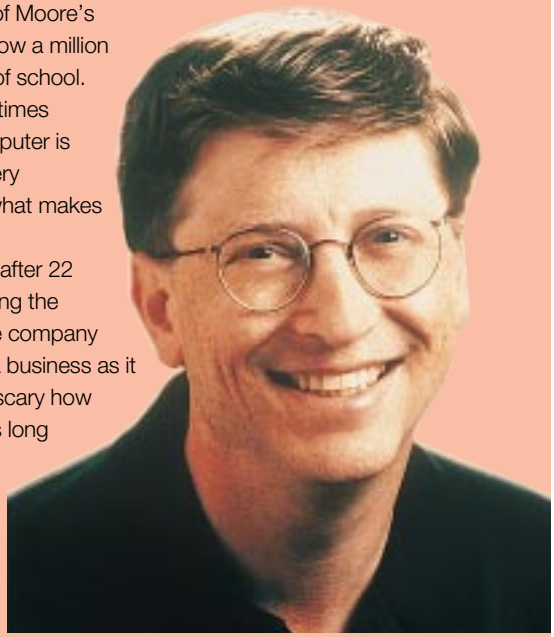
"Morgan's started 25 years ago, making it five years older than *PCW*. However, it took some time for the company to cotton on to the fact that PCs were going to be the next big thing. To start with, Morgan's sold second-hand cameras and equipment. The company didn't get into the PC market until the mid-eighties, when it started selling second-hand PCs.

"The customer has changed. When we started out, most of them were enthusiasts and of course there's always going to be people out there that don't need an all singing, all dancing computer.

"Now, our customer base has broadened out and we deal with a lot of schools and other education facilities, which are looking for budget machines to train students on.

"The most dramatic thing that has struck me about the way the industry has changed over the years has been the prices. That we were able to sell a 386SX 16 for under £2,000 actually warranted a four-page article in *PCW* in about 1988."

Bill Gates, chairman, Microsoft



"Due to the wonderful benefits of Moore's Law, the microprocessor is now a million times faster than when I dropped out of school. In the next 20 years, it will be a million times faster again. The image of what a computer is ten years from now is certainly very, very different than what it is today. That's what makes this a very fun field.

"It's amazing to be able to say that after 22 years working in the same field, pursuing the same basic idea that we had when the company was started, this is still as fascinating a business as it was at the very beginning. It's almost scary how much impact it's going to have. But as long as this is happening, being at the centre of it is a great place to be and that's why I think I have the best job in the world."

■ *From a speech at Cambridge University, UK, 7th October 1997*

Alan Sugar, founder of Amstrad, non-executive director of Viglen

"Until 1984, Amstrad was a consumer electronics company working in the hi-fi, video and TV sectors. In April '84 we launched our first computer, the games-based CPC 464. From that moment, the Amstrad computer revolution accelerated across Europe, punctuated by the introduction of a series of hugely successful computers, starting with the first mass-market word processor, followed [by] the first 'people's computer', the PC1512. Amstrad achieved a 35 percent share of the European PC market within a few short years.

"However, the market was turning the PC into a commodity and by the late eighties the rest of the world had caught up with Amstrad. The PC industry became…the most competitive of market sectors, with major players happily losing money to capture market share. Today it is a nightmare for PC manufacturers, with everyone making a headlong dash for the latest technology, set against a fierce battle for margins."

Sir Clive Sinclair, British computing pioneer

"When I started out, I was just interested in getting people interested in computers. It was very exciting then. There was a lot of innovation. There's no technical change now — it's all just Wintel stuff. It's just all got bogged down. The designs are very clumsy nowadays. They're not taking risks at all, they're just making the same sort of machines. The only breath of fresh air is Psion. They're terrific and they go their own way. Windows CE is a hope, as well.

"I thought computers today would be used for the same kind of things they were used for then. I could see them becoming ubiquitous. But what has disappointed me greatly has been how little change there really has been. Take parallel computing — it's ridiculous, it should have happened by now. Computers should be hundreds of times more powerful than they are now. They're also absurdly expensive for what they do. Very little of the price is from processing power.

"I don't use the internet at the moment. I get frustrated by the speed. If they would sort that out, then I would use it. But I think it's a most marvellous thing, it's amazing what can be done with it. I just don't want to use it while it's so slow."

As time goes by

The march of IBM

The personal computer world changed forever on Tuesday 11th August 1981, when the largest computer maker in the world, IBM, announced the IBM Personal Computer. It wasn't the first PC in the world — other manufacturers such as Sirius, Apple, Altair and Tandy had already released their own "microcomputers" (now there's a word we don't hear too often these days). However, the arrival of a PC bearing the IBM badge effectively legitimised this class of computing, and where it led, others rapidly followed. It was developed in conditions of strict secrecy in a little over a year at IBM's plant at Boca Raton in Florida by the late Don Estridge, whom many regard as being the father of the PC.

Prompted to enter the PC market by the runaway success of the very cheap Apple I and II micros, IBM had originally considered rebadging Matsushita or Atari games machines. Luckily for IBM, its Corporate Management Committee rejected such heresy and asked for the new PC to be developed in-house by the new Entry Systems Division. All IBM kit has traditionally sported a four-figure model number and this new baby was no different — it was a Model 5150.

The new PC broke with IBM tradition, as it was an open design based on third-party components. Most significant of all, IBM decided to buy-in an operating system. Digital Research was approached for CP/M but, by a stroke of phenomenal luck for Bill Gates, IBM turned to the software house that was providing BASIC for its new PC — a little-company called Microsoft. Microsoft didn't have an operating system but quickly bought a company, SCP, that had produced a knock-off of CP/M, called Q-DOS. This became MS-DOS and Microsoft became hugely successful.

The specification of the IBM PC makes for interesting reading these days. Powered by an Intel 8088, a hybrid 16-/8-bit microprocessor, running at a leisurely 4.77MHz, the IBM PC was offered with a choice of either one or two 5.25in floppy drives for storage, although there was a DIN socket at the rear for a cassette. If you didn't boot from a system floppy, the ROM-based BASIC would automatically load. Single-sided 160Kb Tandon floppies were originally shipped but were quickly superseded by 360Kb, double-sided versions. The motherboard typically came with 256Kb of soldered DRAM, had five 8-bit ISA expansion slots and a socket for an 8087 maths co-processor. You had a choice of graphics: the text-only Monochrome Display Adapter "green screen" or the CGA Colour Graphics Adapter, which offered 16 colours at 320 x 200.

Hard disks didn't turn up until the launch of the PC XT (Extended) version in March 1983 — the first time a hard disk was a standard item in a PC. Outwardly identical to the original PC, the XT had a 10Mb (or later a 20Mb) MFM hard disk and was available with 256Kb or 640Kb of RAM and eight ISA slots, one of which was stolen by the hard-disk controller card. Half-height floppy drives were standard, allowing you to fit two drives in the other drive bay. Late models could also be fitted with a 720Kb 3.5in floppy drive. In 1985 an XT model was released without a hard disk, effectively making the other PC model obsolete. Other special versions of the IBM PC were also released, including the 3270 PC which was designed to mimic a 3270 terminal, and the XT 370 which emulated a System 370 mainframe.

True 16-bit technology arrived with the Advanced Technology PC, the PC AT (below), in August '84. Powered by a 6MHz Intel 80286 processor, the new PC offered three to five times the performance of the original IBM PC. New to the AT was the use of a battery-backed real-time clock and configuration details held in CMOS memory (the PC used DIP switches). Other innovations included 1.2Mb 5.25in floppy drives, 20 or 30Mb hard disk and the ability to address 16Mb of RAM. There were six 16-bit and a pair of 8-bit ISA slots, all housed in a large system case, which forms the basis for most clone system cases to this very day — this was the first system case to provide spare drive bays for peripherals.

Many users spotted that the AT's 6MHz clock crystal was socketed and so could be swapped for a faster crystal to make the 80286 run quicker. IBM promptly stomped on this practice with the release of a new AT with a BIOS that fixed the clock speed at 6MHz. In April 1986, an 8MHz model was finally released. This version supported 1.44Mb floppy drives for the first time. In an odd move, September 1986 saw IBM launch the XT Model 286, which was essentially a slightly faster AT motherboard in an XT case. This was fine but for one small point: the AT case was taller than the XT's and 16-bit AT cards wouldn't fit in the XT case! Well, not without the aid of a can opener.

In an attempt to rid itself of those pesky cloners, IBM launched the Personal System/2 range of PCs in April '87. These were advanced PCs, largely made from plastic snap-fit parts that permitted automated assembly and rapid disassembly. Internal cabling was conspicuous by its near absence. The PS/2 range which spanned 8088, 80286 and 80386 processors featured a raft of innovations, including a new proprietary Micro Channel Architecture expansion slot and enhanced graphics in the form of EGA and VGA graphics adapters. The PS/2 Model 30 was the PC replacement, with an 8MHz 8086 CPU, the PS/2 Model 50 had a 10MHz 80286 plus up to 60Mb of hard disk, while the Model 70 used the new 80386 processor running at either 16, 20 or 25MHz. The Model 80 was essentially a floor-standing version of the Model 70.

So far, IBM had succeeded brilliantly in the new personal computer market, selling millions of PCs. But by 1987 it was clear that its market dominance was coming to an end: the new start-up, Compaq, had beaten it to the technology post with the launch of the Deskpro 386/25 — the first PC to feature the 80386. Ten years down the road, Compaq is now the dominant PC supplier.

Roger Gann

The ripening of Apple

It was a classic story of American business success. Two young entrepreneurs turned a little technical knowledge into a business idea, took a calculated risk and formed what would eventually become one of the most innovative companies in the world. The entrepreneurs in this case were Steve Wozniak, 26-year-old programmer for Hewlett-Packard, and Steve Jobs, a 21-year-old computer hobbyist. The company they formed on 1st April 1976 was Apple Computer.

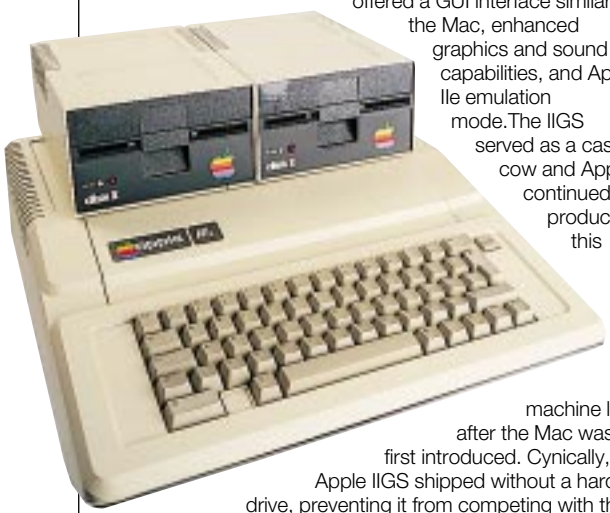
At a series of bi-weekly meetings of the Homebrew Computer Club in Palo Alto, California in 1976, Wozniak displayed enhancements to his home-built computer based on the MOS Technology 6502 chip. Steve had selected the 6502 (£16) in preference to the more expensive Intel 8080 (£110) or the Motorola 6800 (£108). Jobs and Wozniak pooled their resources, constructed the first Apple computers in Jobs' garage, and sold them to a local dealer.

The underpowered Apple I was quickly replaced by a more functional, more consumer-orientated Apple II, that in many ways dictated the personal computer paradigm that still lingers today.

The Apple II series

The Apple II (below) featured upgradeable RAM, an 8-slot expansion bus, separate monitor and keyboard, sound and colour. The ability to add hardware on the motherboard or via the expansion slots was crucial to the success of the Apple II series and was emulated by the IBM PC, the clones and most future generations of PCs.

The Apple IIGS, the final model in the Apple II series, offered a GUI interface similar to the Mac, enhanced graphics and sound capabilities, and Apple IIe emulation mode.The IIGS served as a cash cow and Apple continued to produce this machine long after the Mac was first introduced. Cynically, the Apple IIGS shipped without a hard drive, preventing it from competing with the fledgling Mac market.



The Lisa

Jobs and a group of Apple engineers were impressed by a visit to Xerox PARC's research facility where they viewed prototype systems employing a graphical user interface and a pointing device. Apple attempted to incorporate many of these ideas into the Apple Lisa (above, right), named after Jobs' daughter. Like many subsequent Apple products, the Lisa was priced high enough to ensure its failure.

The compact Macintosh

The Macintosh was an evolutionary attempt to provide Lisa technologies with a small system footprint at affordable prices. Although the Macintosh 128 (right), Apple's first "Mac", was vastly underpowered, the inevitability of the graphical user interface was obvious to anyone who took the time to use it. The "compact" Mac family evolved to include systems with internal hard drives, an expansion slot, more RAM and ROM, a Small Computer System Interface (SCSI) and, eventually, even colour. Released in January 1986, the Mac Plus was the star of those early years, with enough power to justify the growth of niche software industries like desktop publishing, presentation graphics and idea processing.

The Macintosh IIFX

Apple eventually broke out of the "compact" mode and rejoined the Apple II "box" paradigm in March 1990 with the introduction of the Mac II series. The Mac IIFX came in a more conventional case, was considered to be "wickedly fast", and featured six Nubus expansion slots.

The Macintosh LC

Released in October 1990, the Macintosh LC was the most affordable Mac of all time. Retailing for about a quarter of the price of the Mac IIFX, the LC offered colour, limited expansion and Apple IIe emulation.

The Quadra, Peforma and Centris Macintosh

There is no doubt that each of these Macs had something unique to offer some segment of the public. You had to be very lucky to discover which model suited your needs, and Apple had to be even luckier to determine production levels. It was a sort of reverse Swiss Army Knife approach to marketing, where instead of selling one model that does everything, you try to sell unique models to cater to certain needs. This strategy almost killed the company.

The PowerPC

Apple released Macs based on the PowerPC RISC processor and provided an amazing degree of compatibility for older programs through system emulation software. This seamless migration from one processor family to another was unprecedented in the history of computing and contrasted sharply with the myriad problems faced in the WINTEL world simply upgrading from Windows 3.1 to 95 and NT.

Later-generation PowerPCs also included an IDE system bus, giving Mac users access to cheaper hard drives and peripheral boards. The PowerPC processor, now in its third generation and featuring a backside cache, offered a significant boost in speed. The G3-based Macs are now competitive in price and are faster and significantly easier to use. It may, however, now be a case of too much, too late.

Mick O'Neill

p120 ➢

The rise of the home computer

Although computers have changed significantly over the past 20 years, the reasons to bring one into your home have remained pretty much the same: word processing, accounts and a little innocent hobbyist activity. Kids have and always will play their parents on the educational angle to get their hands on the hottest games machine, although ironically many will become closet programmers in secret and grow up to build respectable IT careers.

As far as I'm concerned, home computing in Britain began in the early eighties, a time when dedicated games consoles such as the Atari VCS (below), Mattel IntelliVision, CBS ColecoVision (with its later Adam computer add-on) and MB's (Mac-inspiring-case) Vectrex, ruled the roost. Until this time computers were hefty, terribly serious and prohibitively expensive machines, limited to big business or scientific research. No-one complained because why would you want such a beast in your home?

Sure, there were so-called "affordable" Apple IIs, PETs and TRS-80s, but for the rest of us Clive Sinclair, then *sans* knighthood, changed our whole outlook in 1980 when his Cambridge-based company released the ZX80 for under £100. It was about the size of a desktop calculator, had about

as much power as a modern digital watch and looked absurd when dwarfed by the huge TV sets to which it was commonly connected. But for all its faults, it sparked an enthusiasm and excitement about computers in the UK which, in turn, resulted in this country being one of the most IT literate in the world.

These were the golden years, with British and American companies releasing home micros like there was no tomorrow: Acorn and Sinclair flew the UK flag while Commodore and Atari represented the US. Almost all had one thing in common: a complete proprietary incompatibility with any other system which would seem intolerable today. Apart from countless games, serious software was often in short supply, limited mostly to programming languages so you could write your custom applications.

The ZX80 was joined in the same year by Atari's rather excellent 400 and 800 and the venerable Acorn Atom. 1981 was another winning year, with Sinclair's ZX81, again costing less than £100, Commodore's VIC-20 and the first BBC Micro, developed by Acorn.

1982 saw Sinclair's finest mass-volume hour with the release of the ZX Spectrum (bottom of page), complete with colour, sound and 16Kb of memory for £125: another £50 got you an extensive 48Kb of RAM to play with. Rather less successful that year were the NewBrain and the Welsh Dragon 32 (later to be replaced by the Dragon 64). Looking back, I recall being amused by the wealth of curious British home computers, but today it really is remarkable to think that we were producing all these machines like they were going out of fashion.

Sadly, they did go out of fashion, but not before 1984 saw the Acorn Electron, the Jupiter ACE and the Oric-1, whose only real saving grace was an excellent built-in loudspeaker. 1983 witnessed the superb Commodore 64, again launched as a semi-serious business machine but ending up as a "must-have" games platform.

Amstrad entered the home computer fray in 1984 with its CPC-464, followed by several enhanced versions. Sinclair launched its innovative QL with a 68000 processor, split 16- and 32-bit personality and 128Kb RAM, but it never was as successful as its predecessors. The Japanese invasion began with the MSX concept, an attempt at a home computer standard between several major companies such as Sony and Yamaha. Unfortunately for them, each tweaked theirs for their specialist areas (such as Yamaha for music) and the standard was lost.

1985 saw the last of the home computers as we knew them, with the release of the Atari ST and the Commodore Amiga, again both touted as excellent business machines but both playing rather good video games. To be fair, the ST made a big name for itself in DTP and sequencing, while the Amiga often found itself in video post production.

The powerful Acorn Archimedes turned up in 1987, but this phase of home computing was already drawing to a close as the calendar approached the nineties. Many of us were still deriving pleasure from the Atari ST and Commodore Amiga but the excitement just wasn't the same. Most home computer users knew of the mighty IBM PCs and their clones and were envious of their power, compatibility and following.

As prices dropped in the early nineties, IBM clones and even some Apple Macs became affordable options for the home. Budget games players turned to the latest crop of dedicated consoles, which were making a comeback from as early as 1987 with the 8-bit Nintendo Entertainment System and the Sega Master System.

Buy a home computer today and someone will sell you a powerful IBM PC compatible packed to the brim with multimedia. You'd use it to do your home accounts, write letters, perhaps do a little photo retouching, music production or newsletter layout and, of course, top it all off with some games and compulsory internet access. If you've got kids, you'll still justify all of these as education.

The price you pay for compatibility is boring hardware, essentially unchanged since the first IBM AT apart from getting cheaper and faster. The excitement today comes from the software, the really fun or genuinely useful applications.

Today's thrilling hardware, for me anyway, are PDAs, which curiously seem to be repeating the innovative but often incompatible ways of the home computers of the eighties but in a handheld form.

Serious PC hardware may now have taken over the home, but it could never have done it without the home computers of the eighties fighting the front line of IT acceptance. Don't get me wrong, I love today's computers; but yesterday's were so much fun. I really do miss those guys.

Gordon Laing

If you want to reminisce about how great, or awful, the games were in the early eighties, check out the archive section on this month's PCW cover CD-ROM.

Windows of opportunity

Windows was born 15 years ago. The project had been particularly daunting and it will come as no surprise to seasoned Windows users that its shipping date slipped badly. In fact, it didn't surface until two years later, in November 1985. It wasn't a great product: it was visually inferior to Digital Research's GEM GUI interface and windows could only be tiled, not overlapped. Screen resolution was low and you used a DOS window to perform your file management tasks. It was hardware hungry too, and needed 640Kb and a hard disk, plus the assistance of the new Expanded Memory standard. Applications support was poor: in two years, the only significant Windows application to surface was PageMaker.

Windows version 2.0 became two products: Windows/386 (for 80386 speed demons) and Windows 2.0 for those with lesser kit. A watershed was reached with the release of Windows 3.0, in May 1990. Not only did it feature a much-enhanced icon-based interface with support for higher-resolution displays, but its support for networking was revamped and extended, too. Memory management was improved and three modes of operation — real, standard and 386 enhanced — were now possible. Addressable memory was increased from 640Kb to 16Mb on an 80286 and, theoretically, 4Gb on a 386. New features included a proper file manager, a macro utility, Windows Recorder, colour palettes based on the video hardware and a colour paint program based on Paintbrush, plus a simple terminal program.

Windows 3.0 was the most popular version yet: it sold by the boatload. But most users remember it mainly for UAEs (Unrecoverable Application Errors). This problem was largely solved with the release of Windows 3.1 (right, top) just over two years later in May 1992 (UAEs became GPFs, or general protection faults!). Cosmetically identical, the new version offered many improvements and new features. Its internal code was overhauled (some of it 32-bit), a new print engine fitted and better, faster disk cacheing added. Object Linking and Embedding (OLE) replaced DDE (dynamic data exchange). DOS sessions were smoother, and TrueType, a new screen and printer font rendering system, was introduced. Multimedia features now came as standard. Overall this was a far more stable product. Free System Resource (FSR) limitations were also relaxed slightly in this release.

By the end of 1992 Microsoft had released a proper networking version of Windows, Windows for Workgroups 3.1, which as well as the usual array of network clients also included basic peer-to-peer networking as standard. Both File Manager and Print Manager became network aware, while the new ClipBook Viewer permitted the sharing of objects across the network via DDE. Other network utilities were included for the first time, including Mail and Schedule. Its most significant drawback was its support of DOS-based workstations as clients only. This, and its poor security, didn't endear it to network administrators.

At the beginning of 1994 Microsoft released Windows for Workgroups 3.11, which addressed some of these shortcomings. Like its predecessor, Windows for Workgroups 3.11 integrated drive sharing (including CD-ROM drives), printer sharing, email, and group calendaring and scheduling into Windows. It was also the first manifestation of Microsoft At Work, an architecture designed to integrate telephones, printers and fax machines with Windows PCs. The network functions included notification of completed print jobs, connections to shared resources through Print Manager and File Manager, and an extensive security system. Its 32-bit Disk and File Access also made it the fastest Windows yet — if you had a 4Mb 486, that is.

August 1995 saw the release of Windows 95 (above), the fourth major iteration. It was at least 18 months late and required even more hardware resources than its predecessor. It was a radical departure from all its predecessors. Far more object-orientated than previous versions, the Windows 95 interface was more closely aligned with the Mac, featuring a desktop metaphor. By now, Windows was a 32-bit operating system (with some 16-bit elements) though it still ran on top of a version of DOS. True pre-emptive multitasking made its début, and games and multimedia support was good. Hardware support and conflict resolution was also much improved. This was the first operating system to support plug-and-play. As a result, installation was much simpler but much longer. Networking support continued to improve and internet support manifested itself for the first time, thanks to the Dial-Up Networking feature. Windows 98 is expected this summer.

Windows NT

Shortly after the launch of Windows 3.0, Microsoft began developing a more powerful operating system. For some years it had been working co-operatively with IBM and was developing the next major revision of OS/2, version 3.0, which had been a character-based operating system like DOS — until it fell out with IBM big time in 1991, that is.

The result of this parting of the ways was Windows New Technology, or NT. As with all other versions of Windows, the initial release, v3.1, was released some 18 months later than originally promised, in the summer of 1993. Using the Windows 3.1x interface, this operating system ran on MIPS R4000 and Alpha as well as Intel x86 CPUs. Windows NT was a true 32-bit "mission critical" operating system and so was much more robust than Windows, which even today remains a bit flaky. It was available in Server and Workstation versions.

Version 3.5 was released in September 1994 and improved on the original release's rather weak networking support. A "point" upgrade, v3.51, followed in May 1995. Support for the PowerPC CPU was included but this didn't last long. Eventually, only the Alpha and Intel CPU platforms would be supported by Windows NT.

NT didn't get the full benefit of the Windows 95 object-based interface until August 1996, with the release of Windows NT 4.0 which, for the first time, shared common features with its sibling. Windows NT 5.0 is much delayed and we'll be unlikely to see it this year, given the uncertainty raised by the US Department of Justice investigation of the inclusion of IE4.0, an integral part of Windows NT 5.0.

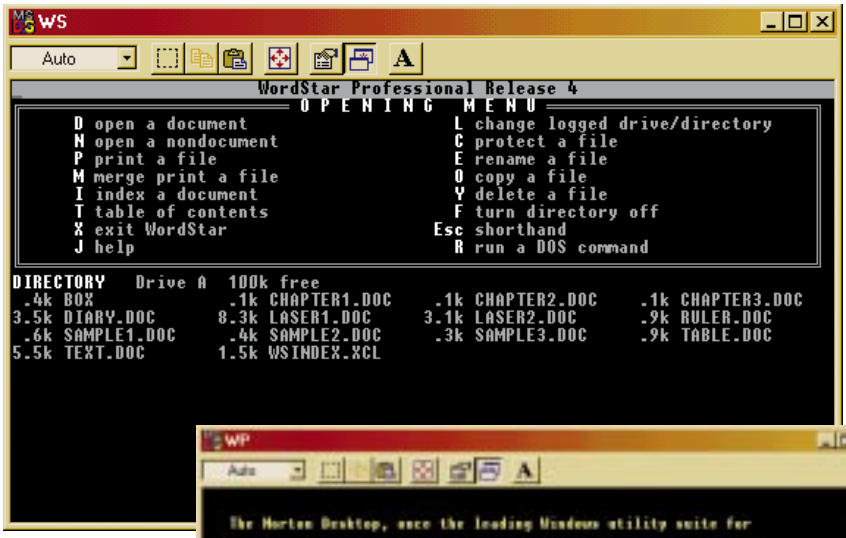
Roger Gann

p122 ➢

From the word processor to the office suite

Our 1979 timeline page (*p77*) shows how novel and exciting the idea of a word processor was at the dawn of the desktop computer. Early micros quickly sprouted editors which, within five years, became sophisticated even by today's standards, with features like spell-checks, macros, outliners and mail-merging.

There was an early need for a single, friendly package on which companies could train staff. WordStar, launched in 1978 on machines running the pre-DOS CP/M operating system, became a *de-facto* standard even before it was ported to the PC. Its control-key combinations, chosen for ease of use by touch-typists, were much copied, notably by Sidekick's famous pop-up editor and Borland's Turbo Pascal code editor.



WordStar had two drawbacks. Its interface was cumbersome (a half screen was taken up by details that today would be contained in drop-down menus) and formatting codes were displayed with text, which was confusing and alarming for new users.

WordStar (shown, top) was superseded as market leader by WordPerfect (centre) which appeared first on Data General minicomputers in 1980. By contrast, it presented an almost completely blank screen. It required the learning of a new set of control keys but there was instant help at the touch of a hotkey. Formatting commands were normally hidden but could be revealed and edited when required. This is an advantage WordPerfect retains over modern Word, in which some formatting can be tricky to undo.

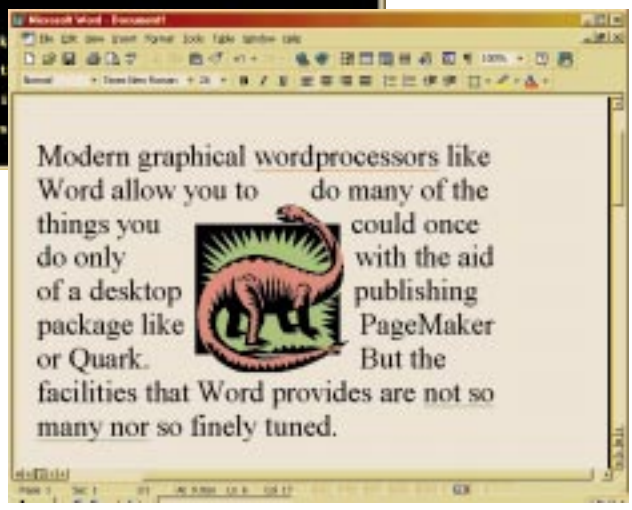
WordPerfect evolved into a very good program indeed. My favourite version was 4.2 (launched October 1986): the speed and do-it-now simplicity of its macro facility has not been surpassed. By 1987, WordPerfect was offered as part of an integrated suite called first WordPerfect Library, and later WordPerfect Suite.

This was a time when the PC world was still shackled by a 640Kb limit on RAM. Remarkably, WP Library offered within that limit the ability to run a spreadsheet, a contact database with auto-dial, a macro editor, a program editor and a word processor back to back (albeit not all at once) and to switch easily between them. This was not multitasking, because the PC was doing only one thing at a time, but it was a fair imitation. Moreover, you could swap information between programs via a clipboard, and the modules could interact: the database, for instance, feeding data for a mail-merge. The package had a fatal drawback, though: it lacked WYSWYG. Apple had shown with the first Mac that this was possible on a desktop computer and the PC world clearly had to follow.

But WordPerfect, in a pattern common in IT evolution, had become constrained by its own success. Its millions of users would object to major interface changes, yet major change was needed to fully exploit a graphical environment. When WordPerfect tried to go graphical, it lost its way.

Windows, which took to itself the task of printing, removed at one stroke a big advantage of WordPerfect: its huge library of drivers, which ensured that the program would work with virtually any printer. WordPerfect for Windows did not emerge for two years after the launch of Windows 3.0 and was slow and flaky when it came. It got better, but by that time Microsoft Word (below) was making the running.

Word, coming from the same company that wrote Windows, naturally made the most of the environment. (There were claims, then as now, that Microsoft kept some Windows calls secret to give its own applications an edge.) Microsoft followed Word with the Excel spreadsheet, the Access database and other office applications, all built from scratch for Windows and learning from DOS-based rivals. Then Microsoft applied the logic of integration to Windows, where it could be taken further than ever before. The result, Microsoft Office, now has 86 percent of the market. Ironically, WordPerfect provided, in the rich integration of its early suite, a template for its own downfall.



Clive Akass

p124 ➢

The progression of spreadsheets and databases

1977 was the year of the Tandy TRS 80, the Commodore PET and the Apple II. The Apple had to be plugged into a TV, but the PET had an integral monitor and really looked like a business computer. It had a MOS Technology 6502 chip, BASIC in ROM and 16Kb of memory. BASIC was dead slow, but you could achieve a remarkable turn of speed by poking assembly language directly into its memory. Then, as now, fantastic technology was useless without the software to go with it and, as everyone knows, the only software a business needs is a word processor, a database and a spreadsheet.

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1	ACCOUNT BALANCES SUMMARY			
2				GBP EQUIV
3	HSBC HK	HK$	17246.54	1437.21
4				
5	MIDL LON	GBP	243.87	243.87
6				
7	BBME DUB	AED	438.15	62.59
8				
9	BBME BEI	LBP	3257.04	271.42
10				
11	HSBC SING	SG$	12.13	3.89
12				
13	CITI NY	US$	14231.04	8371.20
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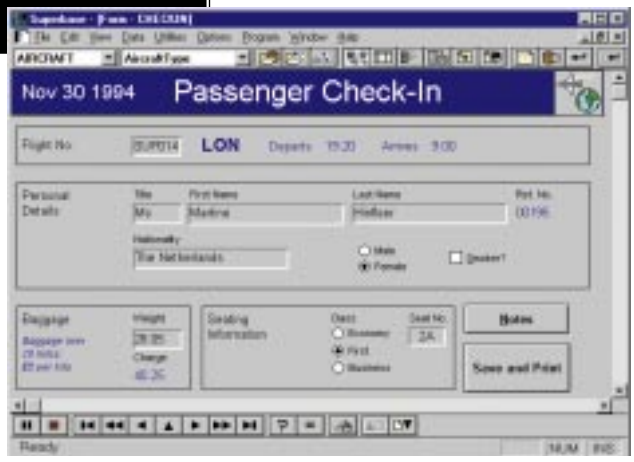
Database management was already second nature to a computer, although doing it on a personal computer was a bizarre idea. But a spreadsheet? Where did that idea come from? The answer is, from Dan Bricklin at Harvard business school. He came up with the idea of electronic graph paper, so you could have a column of related figures, change the number in one and have the change ripple through the others without further ado. For businesspeople eager to work out how much more money they could make by upping the price a penny or two, it was black magic, a must-have for every smart young suit. The idea became commercial reality when VisiCalc (above, top) appeared from Software Arts in October 1979, not for the PET but for the Apple II. Before long, though, it appeared on all the popular computers, and my PET copy was really good.

VisiCalc was copied, and Lotus 1-2-3 was one such, released in early 1983 exclusively for the IBM PC. The 1-2-3 idea was that it integrated spreadsheet, graphics and database features, although using a spreadsheet for storing data was as bad an idea then as it is now. Oddly, another company who borrowed the VisiCalc idea was Bill Gates' Microsoft, whose inferior Multiplan had already appeared, first on the Apple II and then on the PC. Multiplan never caught 1-2-3, but a few years later the real threat appeared.

It was called Excel, it was graphical, it was for the Mac, and it made its début in 1985. Two years later, the Windows 2.0 version appeared. Lotus took years to come up with a Windows 1-2-3. Initially this was bad news for Windows, but Lotus was the loser in the end. The funny thing is, all the spreadsheets I've used have been decent products, from VisiCalc through to Excel, 1-2-3, Quattro, and including quirky things like Lotus Improv. Spreadsheets have an uncanny synergy with the personal computer. Even a shareware product, called Opus, on the Atari ST was superb.

Database managers are another thing completely. Like spreadsheets, databases boil down to rows and columns but somehow have a snarling antipathy to both computers and users. On the PET, I had a thing from CompSoft that ground my smart dual-floppy disk drives to pulp and never worked properly. While the spreadsheet folk polished their user interfaces, the bewilderingly popular dBase had no user interface at all and its makers inflicted permanent confusion on an unsuspecting world by calling a table a database. Of course, I exaggerate. But dBase II, the 1981 first version, was not really an application, more a programming language. This meant trouble for novices who bought the shrinkwrap, but developers who knew the spells could brew up a no-nonsense, menu-driven business application which provided a meal ticket for life.

On the PC, dBase dominated absolutely, despite the massive handicap of being marketed by Ashton-Tate, a company which comprehensively lost the plot after the release of dBase II Plus, the first network version, in 1985. Its main competitors were clone products like FoxBase, marketed on the simple but effective basis of being fully compatible but faster and better. So it was, and even more so when FoxPro arrived. Other canny developers used Borland's Paradox, a product which actually understood what data management was about but was, if anything, even harder to learn and use.



When Windows 3.0 turned up in 1990, Microsoft was content to have Cardfile as its only database product; developers shrugged and went on using xBase. The reason is that database managers have a far smaller market than spreadsheets and databases, especially as nobody had figured out how to make them usable by novices. Databases contain important information, and nobody wanted to trust it to a flaky environment like Windows. It was an opportunity there for the taking.

Over in the flatlands of Cambridge, somebody took it. Precision Software's Superbase (above) started out as a CP/M product and achieved real success on the Atari ST and the Commodore Amiga. It was programmable, but also had a proper user interface and cheerfully stored pictures as well as text and numbers. Quickly ported to Windows 3.0, it was the only sensible choice, selling strongly at a nice, expensive price. That was until the big boys woke up. Superbase suffered a one-two-three punch from Microsoft Access, Microsoft FoxPro and Borland Paradox for Windows. They were good, they were big brands and they were cheap. In truth, it was the beginning of the end for xBase as well as Superbase. FoxPro, in my view, peaked at version 2.0 for DOS, and dBase simply did not appear until far too late.

It is 1998. Access is the best database, Excel the best spreadsheet. Is there any hope for those who tire of the Microsoft logo? Actually, yes. The world is changing again, and both the web and the concept of client and server, however you wish to construe that expression, are changing the landscape in the same way that Windows did. Yes, and spreadsheets are better than ever but database managers remain as thorny as thorns. Some things never change.

Tim Anderson

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The growth of computer games

When it comes to computer games, just about everyone can come up with their own list of "classic" products. Adventures, platform games, shoot-em-ups and simulators: we all have our favourite titles. Looking at releases over the past 20 years brings back a lot of memories — mostly from a time when there wasn't that much memory around.

1978 saw the release of the first popular text adventure for the "new wave" of home micros. Scott Adams' Adventureland was a fun-packed tale of foul-smelling mud and arrived three years before Infocom's legendary Zork on the Apple II. Two years after Zork, Melbourne House introduced us to The Hobbit, bringing Tolkien's fictional world to life with text and graphics. Sierra's Kings Quest took this idea further on the PC in 1984 with a character who wandered around a completely graphical world.

Possibly the last great adventure, in the traditional sense, was The Pawn, Magnetic Scrolls' 1985 sword-and-sorcery extravaganza. It sold a lot of Atari STs before being converted for PC audiences.

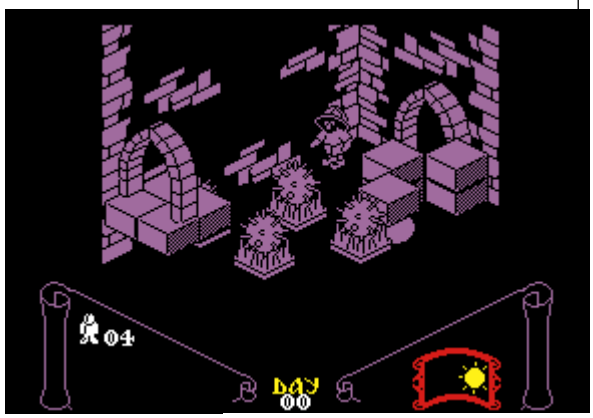
While early adventurers battled dragons into the small hours, action fans enjoyed playing with their Willy. 1983 saw the arrival of Miner Willy in the Spectrum classic Manic Miner, swiftly followed by the sequel Jet Set Willy. Such was Manic Miner's popularity that I can still remember how to get infinite lives... Poke 35135,0. Pass the anorak!

Platform games continued to be a hit on the PC, with Broderbund's Prince of Persia leaping into the spotlight. Sadly, the sequel was nothing to write home about and we haven't really seen a classic since.

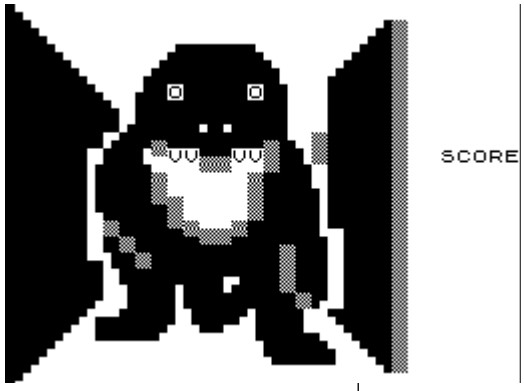
Simulator fans may sing the praises of Microsoft but its Flight Simulator didn't land until 1983. Psion took to the skies a year earlier with its ZX81 Flight Simulation and then brought it to the Spectrum in colour. Acornsoft took us to the stars in 1984 with Elite (below), a groundbreaking space trading/combat sim with silky-smooth 3D vector graphics, and later drove us to distraction with Revs.

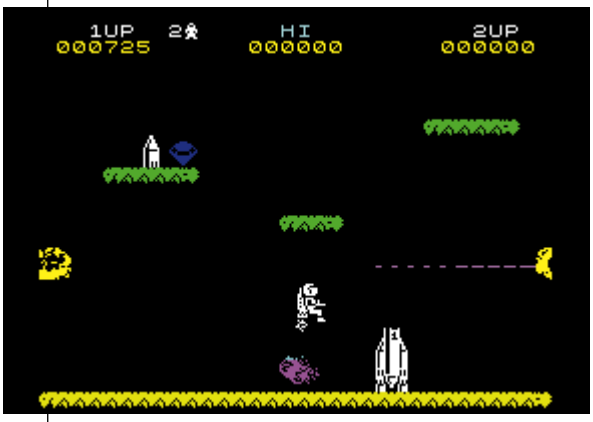
Psion also introduced the UK masses to the shoot-em-up in 1982 with its ZX81 and Spectrum clone of Space Invaders, called Space Raiders. These were followed by Imagine's Arcadia and JetPac (below) from the legendary Ultimate Play The Game. Later, Graftgold's Uridium on the C64 set the standards by which others were judged.

Fisticuffs went digital with the release of Karateka for the Apple II in 1984, and the genre received a huge kick a year later from Way of the Exploding Fist on the Commodore 64. More recent hits include the gory Mortal Kombat, but most gamers agree that modern combat is best left to consoles.



Isometric action arrived early, with 3D Monster Maze (right) for ZX81 and the hit





Spectrum with Sandy White's Ant Attack.

Ultimate amazed all with Knightlore (above, top) in 1984, which spawned a number of popular clones, including Batman from Ocean. Apogee's Wolfenstein 3D got the PC market going, but it was the legendary Doom (above) that finally led us all down the 3D path in 1993.

Finally, what nostalgic trip would be complete without Tetris, possibly the best puzzler ever produced? Written by s Russian, Alexey Pajitnov, in 1985, it arrived long before *perestroika* and did much more to raise the awareness of programming skills in the Eastern Bloc.

All this, and we still haven't touched on the arcade cabinet classics like Pac Man, Donkey, Asteroids and Battlezone. Oh yes, I remember them well…

Chris Cain

■ *Fancy a (real) blast from the past? Then check out this month's* PCW *cover-mounted CD-ROM for a selection of the finest classic computer games and emulators.*

p129 ➢

Evolution of browsers and the net

A shiver went down my spine the first time I tried Mosaic, the earliest widely successful graphical browser. Five years later, with browsers taken for granted, it is harder to see why they caused so much excitement. The internet had been gestating since the fifties; a bomb-proof military communications system that spread out into academia. Private use began to build up in the eighties but home and small-business users generally went online via closed networks like CompuServe in the US, or CiX and Prestel/Microlink in England. There was a scattering of communities around online bulletin boards set up by enthusiasts (*PCW* provided lists of BBSs).

These networks were mostly text based and communication between them was difficult or impossible, so global email did not exist. They also depended on a direct dial-up: if you called a bulletin board in the US you were charged for an international call. The internet, by contrast, was open and infinitely extensible and the servers around which it was based were permanently hooked into the phone network on private or leased lines, some of which crossed oceans. In effect, the net abolished distance: you could contact a server on the other side of the world with the same ease, virtually the same speed, and at the same negligible cost, as you could call one next door. But you needed a lot of capital for a line, so widespread use became possible only when independent service providers put up the money and sold access to dial-up subscribers.

The hippy generation that had protested against the Vietnam war saw this creation of the demon Pentagon as a focus for their idealism. Here was a new medium that would bring people all over the world together, in freedom. The net, they reasoned wildly, was owned by no-one and existed everywhere and was therefore beyond restraint. Net-aware students leaving university contributed the enthusiasm of a new generation. The breakthrough in Britain came in 1992 when Demon Internet offered dial-up connections for just £10 a month. There was a snag, though: you needed perseverance and savvy to get online. Once there, you were knee-deep in Unix, protocols and addresses that were impossible to type.

The worldwide web, almost synonymous with the internet, was already a year old. It was invented by Englishman Tim Berners-Lee at the Cerne particle-physics lab, as a way of distributing information among interested scientists by hyperlinking ideas in documents to related information on the net. The links consisted of an address and a handshake, but they were powerful. Not only was the web infinitely extensible, it extended itself *ad-hoc* as people added links. It was realised that links could be triggered by pictures as easily as by words and could call up video or sound or any other codeable material. There were several attempts to draw these ideas together, including a browser called Cello (above) from Cornell Law School.

Mosaic came from a group of students, led by Marc Andreessen, at the University of Illinois. By adding a graphical interface to the text-based WWW, they created something that was more than the sum of its parts. Mosaic insulated people from the structure of the net, allowing anyone to travel its ways. It was phenomenally successful: something like two million copies were downloaded within a few weeks in late 1993, at a time when it was still flaky shareware.

Silicon Graphics founder, Jim Clarke, persuaded Andreessen to join him in a new company called Netscape. Microsoft was slow off the mark until Bill Gates' famous U-turn, embracing the web in 1996. Netscape Navigator and Microsoft Explorer are both conceptually identical to Mosaic. Newspapers caught on and the net became The Latest Thing. Computer freaks, who for years had been pilloried as socially challenged nerds, found themselves briefly fashionable.

It could not last. The infrastructure of the net has hardly begun to match its promise. The browser is being absorbed into the anonymity of the operating system. But for all the hype, Mosaic was the start of something big. There are wonders yet to come.

Clive Akass

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Mystic mag

Four *PCW* writers predict the role computers will have in our homes and lives 20 years from now.

Gordon Laing, Managing Editor

When people discuss what it's going to be like in the future, there are always common predictions. Who can forget TV shows in the seventies which promised endless leisure time thanks to technology? Well, I don't know about you, but my life at home and the office is full of new technology and yet finding a spare minute has never been harder. TV sets that hang on the wall like a painting were said to be just around the corner in, er, 1974: even now, my lounge is dominated by a huge glass tube which, for a few years yet, looks unlikely to be replaced by a thin gas-plasma set. But I have a vision, and it's definitely of the remote-controlled home.

As the world begins to speak more loudly about convergence, the big computer people are looking to entice the mass-volume home products with their wares. You may think they work fine today, but be under no illusions that Intel wants its chips, and Microsoft its operating system, built into your kettle as standard.

Computers have a reputation for tedium and for being rather uninspiring, but they are remarkably good at talking to each other, and home consumer electronics are great fun. Get them together and imagine what could happen. How about all your electronic and electrical devices connected through a high-speed home network? I reckon IEEE-1394, more charmingly referred to by Apple as "FireWire", will provide the backbone. Sony has already fitted it to its digital camcorders.

How about providing each device with an IP address so that, much like modern network printers, they may be configured, monitored and operated from afar? Stick an IP address in your VCR and you'll never again have to worry about forgetting to set it. What about one in your cooker, so it's heating your food in time for your arrival? Maybe one in your security system to check out who's hanging around your house. You could also be warned when resources are running low so you'll no longer find you've run out of washing powder or food in the refrigerator.

You'll need a web browser to operate these goods, but forget hefty desk-bound computers. As mobile phones and PDAs converge, we'll have pocket-sized or even wrist-worn devices capable of remotely controlling your home. Like the web, you'll be able to access your home from any browser, anywhere in the world. And speaking of which, you will have a cheap mobile-phone system that works all over the world using an array of satellites.

I tell you what though — my home of the future will have a very strict set of rules about electrical doorknobs, heaters and impersonating the owner: I'm not having it turn against me *à la* Demon Seed. I wonder if Bill Gates has considered that possibility in his high-tech pad?

Clive Akass, Associate Editor

Today's desktops will look as quaint as sit-up-and-beg typewriters do to us, now. Screens, perhaps based on now-embryonic light-emitting polymer technology, will be thin and flexible and used face up, like paper.

Keyboards will be a minority sport. Most computers will be driven by a combination of voice, pen and perhaps eye movement. Computers will never be better at comprehending speech and standard writing than we are; which is to say that they will make mistakes. Advanced users will learn a gesture language, designed for unambiguous reading by a computer; it will resemble nothing so much as shorthand.

Learning to communicate with cyberspace will be as fundamental to education as the "three Rs". Children may do some teaching of their own as, unencumbered by our preconceptions, they develop a new multimedia grammar with its own conventions. (We may not even be able to understand their narratives: researchers 30 years ago found that remote villagers in India could not follow birth-control films because they did not understand cuts and flashbacks.)

The personal computer will evolve more from the palmtop than the desktop. It will be pocketable, with basic standalone functions, and will serve to interface with the network and/or to drive a big-screen workstation. It will also function as an active book, reading disks or solid-state cards capacious enough to use interactive multimedia, including video and spoken text, to an extent that will make today's CD-ROMs seem comically primitive.

Alternatively, SmartCards, incidentally acting as an electronic-cash wallet, will be able to call up a personal computing environment at any interface. Bandwidth costs will have plummeted, enabling many new forms of online commercial activity. Online infrastructure, recognised as a vital communal resource like the roads, will become a political issue. The road analogy will go further as we discover that high capacity does not equate to high speed, nor to a quieter, more comfortable world. Capacity will increase demand and bottlenecks will appear in head-end systems struggling to meet the demand for data streams and in the unimaginably fast switching needed to deliver them.

Paper will be used, but not as it is today. Some advertising will shift from printed to electronic media, making paper publication less viable; much printing will be done on home machines, from data broadcast at night. All will not be for the better, but the technology could help us live intimately at a remove from each other, enabling healthier patterns of living and perhaps new forms of human relationship.

Adele Dyer, Reviews Editor

Microsoft Office 2018 has been unveiled. It takes up 20Gb of hard-disk space, needs a couple of gig of RAM to run, has 1,001 useless features, was two years late in arriving and still GPFs when saving to the network. Not that Bill Gates is worried. He has been given a key job in the Department of Justice by President Andy Grove (Intel Party) and is said to be quite content buying up every other rival business in his sector.

However, Office 2018 finally has thought recognition. Just put a couple of electrodes on your temples, concentrate hard and your thoughts appear on the screen. But be careful to prevent your mind from straying — you never know what may appear in full view.

On your way home from work you can catch up with a little light surfing on your internet specs. They may look as cool as a pair of Oakleys but you can use them to get well nerdy on the net, read the online newspapers or tinker with your credit-card PC which is sitting in your wallet. This PC slips into the same slot in your home terminal/controller as your SmartCard, so it is easy to synchronise data between the two, keeping track of your finances and your movements during the course of the day.

Alternatively, you can log on to your home network, get the household robot to put the dinner in the oven, switch the heating on and turn the taps on in the bathroom, so your bath is run by the time you get home.

In the house you can now settle back to watch your selection of 2,000 TV channels, all of them showing repeats of old programmes, on an 8ft wide, half-inch-thick flatscreen TV. You don't even have to worry about losing the remote; you can just talk to the screen and it will change channel for you. Surround-sound speakers can be built into picture frames.

As the TV is wired into the household network, you can check on the housework robot hard at work in the kitchen and buzz him to bring you a beer from the fridge.

Adam Evans, Technical Editor

Think back 20 years and remember what life was like. No computer games, no internet, no mobile phones, no cool graphics on TV, terrible special effects in the cinema and no desktop publishing (meaning far fewer magazines on the news-stands). These are a few of the countless innovations a mere two decades have brought us. Looking into the future is a tricky business, but with the aid of my crystal ball, here are some predictions for the next 20 years.

The electronic Lego, due to be released this autumn, will have a subtle and long-lasting effect on society. A generation of children building and training these kit robots will ease the acceptance of autonomous thinking machines in the home, like independent roaming vacuum cleaners (already at prototype stage, today).

Advances in internet and digital television technology will mean that it is content, not the means of delivery, which is the most important factor. You will download films over the net and view web pages on your TV. Wireless communications will link everything together, from your car to your fridge. Early adopters will fondly remember the Great Melting Ice Cream Hack of 2012 which caused a river of dairy produce to run down Glasgow's main street. Money will be revolutionised, with a few anachronistic die-hards using cash instead of the secure, convenient, reliable SmartCard. "Save our Euro," patriotic British protestors will cry. "A Euro-American currency is just another way of handing control of Europe to Washington."

A combination of SmartCard technology and intelligent buses and trains will render tickets obsolete, as funds are deducted automatically from your account. Electronic newspapers will be a reality, with wireless communications beaming continually updated personalised information to your electronic paper. Light Emitting Polymer display technology allowing thin, flexible, bright screens of any size, will let you unroll a big screen that you keep in your wallet. But these screens will seem prehistoric compared to the latest 3D TV sets controlled by speech recognition.

Whether all or none of these predictions come true, the next 20 years will provide surprises for all. But one thing is sure: no matter what advances are made, machines will still break down and software will still be buggy. Levels of expectation from technology will be higher but, like it or lump it, the complaints and moans about things going wrong or being just too slow will be the same.

A glimpse into the possible future, from BT Education Services

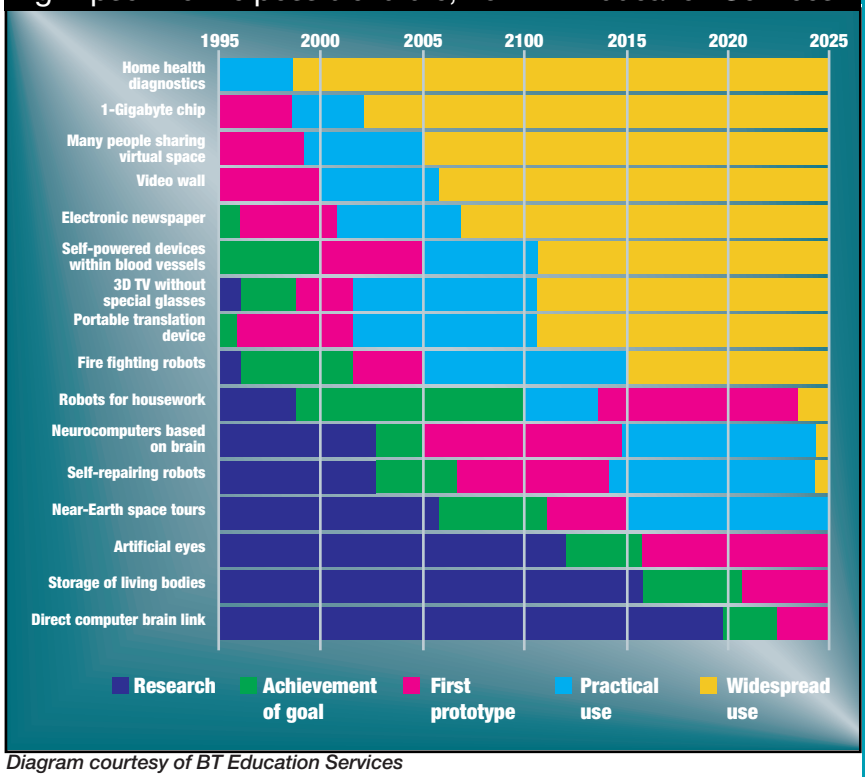

Diagram courtesy of BT Education Services

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Personal Computer World

PCW 20th anniversary competition

To mark our 20th birthday we have invited a selection of prominent companies in the IT industry to donate prizes for this month's celebration competition. So come on and join in this bumper giveaway of fabulous prizes worth a total of more than £8,700!

Elonex

This competition is one that you won't want to miss! The renowned PC manufacturer, Elonex, would like to give *PCW* readers the chance to win one of its **MTX-6300** systems.

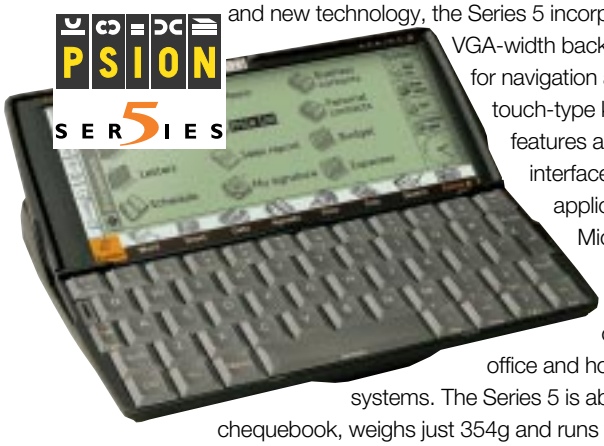
The Elonex MTX-6300, worth £2,345, was the Editor's Choice in our recent 300MHz PII PCs group test (*February 98 issue*) and is arguably every computer lover's dream machine. The Elonex MTX-6300 comes with an Iiyama Vision Master multimedia monitor and was the only system in our group test to offer hot-swappable drive bays.

You simply *must* try your luck at winning this super setup. Mark your postcard "May-Elonex Comp." and send it to the address in the panel opposite (*p135*).

Psion

• *See our PDA group test, p242*

Psion, the creator of the Organiser, is giving away one of its super-duper **Series 5** palmtops, worth £499. Combining innovative design and new technology, the Series 5 incorporates a full VGA-width backlit screen, a pen for navigation and a patented touch-type keyboard. It also features a Windows-style interface, office software applications and Microsoft Explorer, providing total integration and compatibility with office and home computer systems. The Series 5 is about the size of a chequebook, weighs just 354g and runs for up to 35 hours on two AA batteries.To enter this competition, mark your postcard "May-Psion Comp." and send it to the address in the panel opposite (*p135*).



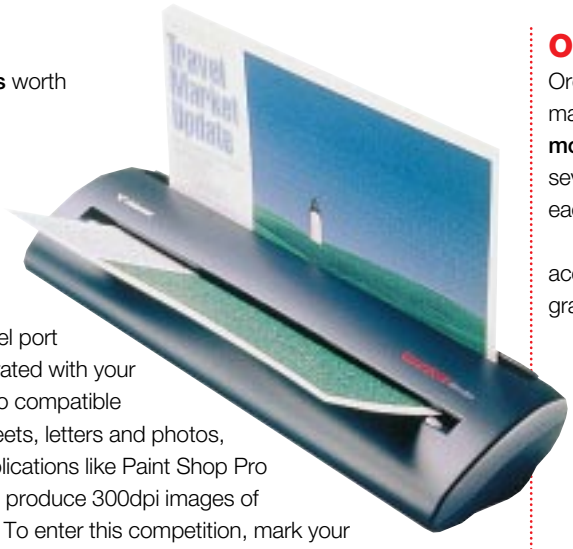
Labtec

Labtec has just launched a new three-piece subwoofer/satellite system, the **LCS-2420**, and would like to give away a set to each of four lucky winners.

This £59.99 three-piece speaker system, reviewed in *Gadgets* last month, features a space-saving Clear Desk mounting system to optimise desk space, 3in Max-Z high-excursion satellite drivers and a 5.25in Max-X high-excursion subwoofer. There's dynamic bass bandwidth equalisation and single-sided controls featuring power on/off, variable bass and volume control. With the LCS-2420 you can bring exceptional computer audio sound to life without paying the extra.

To enter this competition, mark your postcard "May-Labtec Comp." and send it to the address in the panel opposite (*p135*).

Visioneer



Visioneer has two **PaperPort Strobes** worth £175 each to offer as prizes to lucky readers. The PaperPort Strobe, reviewed in our December 97 issue and rated four stars out of five, is simple to use — perfect for those who are unfamiliar with document scanners.

It connects to the PC via the parallel port and the driver software is highly integrated with your PC's existing software, offering links to compatible applications. You can scan spreadsheets, letters and photos, and just drag-and-drop them into applications like Paint Shop Pro or Adobe Photoshop. The Strobe can produce 300dpi images of scanned photos in just over a minute. To enter this competition, mark your postcard "May-Visioneer Comp" and send it to the address in the panel below.

Filemaker

Claris, which has recently changed its name to Filemaker, would like to celebrate *PCW*'s anniversary by giving away five copies of its award-winning database, **Filemaker Pro 4.0**.

Filemaker Pro 4.0, worth £199, allows users to instantly publish dynamic Filemaker Pro databases to the web/intranet and serve related Filemaker Pro data files over sophisticated web sites without having to employ additional CGIs (common gateway interface) and web server software.

Filemaker Pro 4.0 boasts several additional web-enabling capabilities, adding greater convenience for accessing information on the net, including the ability to store GIF or JPEG images. To enter this competition, mark your postcard "May-Filemaker Comp." and send it to the address in the panel below.

CH Products

To round off this month's enormous competition, CH Products is giving away two of its best joysticks — the **Virtual Pilot Pro** worth £105, and the **Force FX** worth £150 — to make sure you get the max out of playing your favourite games.

The Virtual Pilot Pro is the perfect companion to your flight simulation and auto racing games, with the advantage of added professional features. It includes dual four-way switches and six fire buttons as well as elevator and aileron trim controls and throttle. The Force FX is guaranteed to knock your socks off, with six built-in effects that can be experienced through the stick. It, too, features two four-way switches and has five fire buttons and trigger and trim controls for total power.

To enter this competition, mark your postcard "May-Joystick Comp." and send it to the address in the panel, here.

Orchid

Orchid, the graphics card and motherboard maker, is giving away seven **Orchid motherboards** worth £100 each, and seven **Orchid Righteous 3D Accelerators**, each worth around £200.

The Righteous 3D is a dedicated 3D accelerator that delivers true arcade-quality graphics in real-time and has a full-motion frame-rate performance with all 3D features simultaneously accelerated. It operates transparently, with 2D adapters for maximum graphics performance, and has a 4Mb EDO DRAM configuration with dual 64-bit memory architecture. It also features Windows 95 Direct3D support.

To enter this competition, mark your postcard "May-Orchid Comp." and send it to the address in the panel below.

Rules of entry

These competitions are open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, Elonex, Psion, Labtec, Visioneer, Claris, Orchid and CH Products.

The Editor of *Personal Computer World* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

How to enter the competitions

1. Via our web site at www.pcw.co.uk, or
2. Write your name, address and daytime telephone number on a postcard, or on the back of a sealed envelope. Mark your card with the name of the competition and send it to: P.O. Box 191, Woking, Surrey GU21 1FT.

Entries must arrive by 29th May 1998

• *Please state clearly on your entry if you do not wish to receive promotional material from other companies.*

Gadgets

Compiled by Adam Evans. Photography by David Whyte.

Your little friend

PDAs may be tiny compared to notebook computers, but if you only use one to keep your contacts and diary info then why not go for something smaller still? The Rex PC Companion stores up to 3,000 items in something the size of a credit card and runs for six months on two lithium ion batteries. It's also a standard Type-II PC Card, which means you can slot it straight in your notebook (or PC using the docking station) and download contacts and schedules. The software is compatible with Sidekick 98, Schedule+ 7, Outlook 97 and Organiser 97, or you can enter the data yourself manually. Truly shirt-pocketable-tastic.

Price With docking station £169.95; £129.95 without.
Contact Franklin UK 01932 891000 www.franklin.com/rex

Typing in transit

To operate your PC from your armchair or while strolling around your room, you need an infra-red keyboard such as Opti's Freedom. Attractively designed, it feels like a good notebook keyboard and features a rubbery joystick-style mouse pointer in the top-right corner. If you're holding the keyboard in both hands, the pointer falls conveniently under your thumb, leaving your right index finger to operate the left "drag" button. A whole raft of function keys along the top row can be configured to control specific apps. It requires four AA batteries and communicates to a sensor up to seven metres away, which connects to your PC's keyboard and mouse ports. A bargain at £46.52. **Contact** Opti International 0181 591 2000 www.opti.co.uk

Messages on the move

Mobile data is great fun: sending emails, faxes or browsing the web while on the move. The only trouble is not only remembering your mobile phone, but also the PC Card adapter and of course any connecting cables. Worry no longer, for Nokia has effectively built a data-ready mobile phone into a standard Type-II PC Card. Slot this baby into your laptop or PDA and you're ready for cellular communications at 9,600bps. The antenna is built into the end of the card which protrudes a couple of centimetres out of the slot. Yours for around £99 with connection. (Third-party drivers for Windows CE expected soon.)
Contact Nokia 0990 003110 www.nokia.com

Worth the weight

We have seen a few thin and light notebooks over the last few years, but none have been as skinny as the HP OmniBook Sojourn. Believe it or not, the full production version of this notebook with have a 12.1in SVGA TFT screen, P233MMX processor, 64Mb of RAM and a 2.1Gb hard drive, but still only be 1.8cm deep when closed. Despite appearances it is a fairly robust little thing, with a magnesium alloy backing to the screen and reinforced rubber around it elsewhere. Start it up and it packs a powerful punch, being faster than many more conventional notebooks of the same spec. *Full review, First Impressions, p142*.

Price TBA

Contact HP 0990 474747 www.hp.com

Absolutely fabulous

Iomega's Zip drive is often sold as the portable data solution, and while there's loads of people carrying the entire unit and power supply with them, there's got to be a better way. Enter Absolute's zip2GO, a rather cunning rechargeable battery which clips onto any external Zip drive, typically powering it for between two and three hours. Its 1100mAh NiMH battery takes around ten to twelve hours to fully charge, and is compatible with all Zip mains power supplies from around the world. Although you can top it up while using your Zip normally, it's best to fully discharge any non-lithium ion rechargeable batteries before recharging.

Price £49.99

Contact Absolute 01394 284455

Picture this

If you've got a digital camera, one of the biggest hassles can be hooking it up to your PC and sorting out your printer. As long as you've got a Casio camera, such worries could be a thing of the past. The DP-8000 connects to Casio QV-series digital cameras with one wire and out come your pictures on little (6x4in) sheets of photo paper. If you really want, you can get sticky-backed paper too, and connect the DP-8000 to your PC to print other pics.

Price £399.99

Contact Casio 0181 893 2592 www.casio.co.uk

First Impressions

It's getting easier to take it with you: a *very* thin, light notebook from HP **(p142)** or a very small Opti **(p143)**. If you want cheap storage — and who doesn't ? — see the SparQ **(p153)**. Sidekick might be the perfect PIM **(p156)** but PageMill is peachy on the web **(p158)**.

Hardware

NEC Direction SP-266L

A powerful NEC Professional series machine for SMEs. It's ready-to-run and you buy it direct.

Packard-Bell NEC has taken a new direction. It has set up a new arm of the company to sell NEC PCs and notebooks through the direct channel.

The new division, NEC Direct, is pitched against companies like Dell and Gateway which have already proved that the direct-sell approach can reap financial rewards. NEC will continue to sell PCs through its Value Added Resellers (VARs) but is using this division as another way of getting NEC PCs out to potential buyers. It is not as if NEC is a direct-sell novice; last year it ventured successfully into the American and French markets with similar direct-sell operations.

NEC Direct is specifically targeting the SME (Small to Medium Enterprises) market with its Direction brand of PCs. NEC Direct hopes to appeal to companies with simple needs and no need for specially customised, complex machines: that is, those which are hoping to buy no-frills, powerful office computers at competitive prices. So its entry-level range, the Evolution, starts from £649 (ex VAT) for a P200MMX with 16Mb RAM, a 2.1Gb hard disk and a 15in monitor. The other two ranges, the Multimedia and the Professional, are more powerful still. The top-of-the-range Professional SM-333L is a PII 333, 8.4Gb and 64Mb RAM for £1,499 (ex VAT). The Direction brand will not affect NEC's existing high-end corporate Powermate range, which the company sees as catering for clients with a need for more demanding, complex systems.

NEC Direct is setting great store by the quality of post-sale service it believes it can offer, and hopes that SMEs will be attracted to the lower prices of these machines and the efficiency of their build-to-order system. Once demand has been measured and NEC has gauged the success of its new direct-sell approach, the company has plans to start selling build-to-order machines over the internet.

The NEC Direction SP-266L PC we received was part of the Professional series, aimed at those companies which want a machine ready to run. Both the Professional and the Multimedia series come with software bundles: the former with MS Office 97 SBE; the latter with MS Works, Money, Golf and AutoRoute.

The slots on the Intel AL440LX motherboard were mostly free: one of two ISA slots was filled with a Yamaha 3D wavetable sound card but all four PCI slots were empty. The single AGP slot was filled with ATi's Xpert@Play card. The PCI version of this card so impressed the reviewers in our December 1997 graphics card group test, it was awarded our Editor's Choice.

There are three DIMM slots, with two taken up with the 64Mb of SDRAM that comes as standard on the 266L, and access to the slots is uncluttered. The 4.3Gb Ultra ATA hard drive is slung vertically alongside the floppy drive, and NEC's own 32x CD-ROM drive sits horizontally alongside the floppy and hard drive. While it doesn't look particularly roomy underneath, we were quite surprised to find expansion bays for another forward-facing 5.25in drive as well as two more 3.5in drives in this desktop case.

There are a few optional extras available and all clearly target the business user, ranging from NT 4.0 Workstation to Ethernet cards for the PCs, and port replicators or Psion Global Gold modems for the notebooks. Some of the models

Contents

VNU European Labs

VNU Labs tests all kinds of hardware and software, from PCs to modems to databases. All our tests simulate real-world use and for the most part are based around industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for both Windows 95 and NT are the Sysmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

Ratings

★★★★★	Buy while stocks last
★★★★☆	Great buy
★★★☆☆	Good buy
★★☆☆☆	Shop around
★☆☆☆☆	Not recommended

in the series include speakers in the original package; the SP-266L did not, although the 266L does have a sound card so you can always listen through headphones.

The 17in NEC A700 Multisync monitor that is supplied with the PC presented an excellent picture. At a resolution of 1,024 x 768 and a refresh rate of 85Hz the 15.6ins of viewable screen was sharp, with no detectable loss of focus in the corners of the screen. At 1,152 x 864 its refresh rate was a healthy 75Hz and the picture was still as sharp as at the lower resolution. The OSD was thorough and user-friendly, with little need to refer to the manual.

Bearing in mind that NEC is making much of its desire to supply quality, affordable machines to SMEs we checked out its main rivals' prices. In the April issue of *PCW*, both the Dell XPS D266 and the Gateway G6-266 (comparable models with similar configurations) were both around £100 cheaper than the NEC Direct price in the same month.

Nevertheless, the NEC Direct remains competitive.

The SP-266L is a powerful performer, with top-quality peripherals, and is as well-built as we expected. With NEC's reputation as a class act, and the service support the company plans to offer, NEC Direct should do well.

Paul Trueman

PCW Details

Price £1,485.20 (£1,264 ex VAT)

Contact NEC Direct 01706 362812
www.necdirect-europe.com

System Reviewed PII266, 4.3Gb HD, 64Mb RAM, 17in monitor.

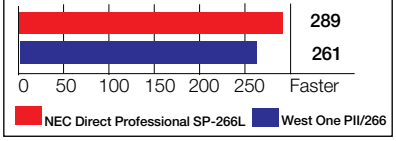
Good Points Powerful performance. Excellent monitor.

Bad Points More expensive than the competition.

Conclusion A good package that is just about competitive.

★★★☆☆

Performance results



p142 ➢

Hardware

HP OmniBook Sojourn

This beautifully-styled, extra-thin, very light notebook scored a huge hit in the *PCW* office.

There is a tendency for journalists to be *blasé* about new technology, so it takes something extraordinary to raise much excitement. And then you get hold of a product like the HP OmniBook. Suddenly, everyone from the publisher down is popping in to see it: the head of systems wants to play with it, and every other journalist on every other magazine in the building is trying to run away with it.

The reason for the excitement is simple — it is half as thick and half the weight of a conventional notebook. At just 1.8cm deep when closed and weighing in at an anorexic 2.6kg, this is the closest yet to being a truly portable notebook. But it still has a 12.1in SVGA TFT screen, P233MMX processor, 64Mb of RAM and a 2.1Gb hard drive.

There are two CardBus-enabled Type II PC Card slots (although these are side by side so you cannot squeeze in a Type III card), one USB port and a 4Mbits/sec IrDA port. There is even sound on the notebook, although it's only a 16-bit SoundBlaster-compatible chip. However, together with the microphone and headphone sockets you will still be able to use the notebook with a voice dictation package.

In short, it has everything you need from a notebook in day-to-day use, except for disk drives. Yet this, too, has been covered: the floppy and CD are in a separate slice, itself only 2.1cm thick, together with all the ports you need — VGA, serial, parallel, USB and two PS/2 ports. The idea is that you can use this layer as a docking solution for when you are in the office and only need to take the notebook itself with you on your travels. However, if you do carry both around at once, the combination is still only the weight and thickness of a conventional notebook.

If you need the notebook for presentations there are a couple of tiny speakers which pop out either side of this slice. The sound from these on the prototype we saw was tinny, but this is a small sacrifice for such portability. Although there are no plans to put DVD in this slice, HP will consider it if demand dictates.

The battery in the notebook should last around 1.5 hours and is made from Lithium Ion. Although in the early stages of design there was talk of using Lithium Polymer, at this stage of the notebook's development the technology option did not offer any longer life and so HP has stuck with what is tried and tested, which at least offers a price advantage. To complement the battery in the notebook there is also a 1cm thick battery slice which has a life of 4.5 hours, pushing up the combined battery life to around six hours altogether. The battery slice can be attached directly to the notebook or it can be bolted on beneath the multimedia slice.

Don't worry about breaking it. The backing over the screen is made from a magnesium alloy while the rest of the casing is made from reinforced rubber. It has even been designed to bend slightly so it will not come to any harm when packed in a briefcase.

When you come to use this notebook, the sheer brilliance of its design comes home to you. Although the model we saw was a pre-production engineering sample with only half the hard disk and RAM of the finished product, it still performed better than the two P266MMX notebooks from Compaq and Gateway reviewed in last month's *PCW*.

Heat dissipation is not a problem. The Tillamook chip runs at a low voltage and the notebook's casing material does not trap as much heat as a plastic case. Although we had the notebook on for around 24 hours, it never got more than faintly warm to the touch.

The only thing potential buyers may be uncomfortable with is the keyboard. As the notebook is so thin, the keys have to be more like PDA keys; extremely shallow and touch-sensitive, using a technology known as thin-hinge. But the keyboard is not meant for touch-typists, primarily because the top executives HP hopes are going to buy it will have secretaries to do all their typing for them. We found it made typing slower than on a conventional keyboard and the touch-sensitivity takes some getting used to, but it is nevertheless manageable. The other minor disappointment is that it will not run NT 4, only Win95.

However, our first impressions are of a truly remarkable machine. There are a few problems to be ironed out in pre-production, but the Sojourn should be a great buy when it is released.

● Mitsubishi, which developed the machine and licensed it to HP, has a similar version which will not be available until later this year.

Adele Dyer

PCW Details

Price TBA. (Battery slice is an optional extra.)

Contact Hewlett-Packard 0990 474747
www.hp.com

Good Points Very slim, very light, very cute.

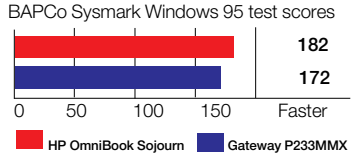
Bad Points Who cares? Just look at the size of it!

Conclusion Everyone who has seen one, wants one, which speaks for itself.

★★★★☆

Performance results

BAPCo Sysmark Windows 95 test scores



NB *The HP model tested is a pre-production model. The finished product will have more RAM and a larger hard disk.*

Hardware

Opti Talisman

A little bit of magic, certainly. But you should consider its overall design carefully before buying.

Sub-notebooks have a particular place in the pecking order of full desktop replacement notebooks down to PDAs. They are light, easily portable, and they run a full version of Windows 95, so you will not have to lose any of the applications you use on your desktop. However, you do have to pay quite steeply for this and sub-notebooks often cost at least three times as much as a PDA.

Extremely small sub-notebooks are nothing new and there are now quite a few on the market (*see our PDA group test, p242*). Nevertheless, few come as small as the Opti Talisman.

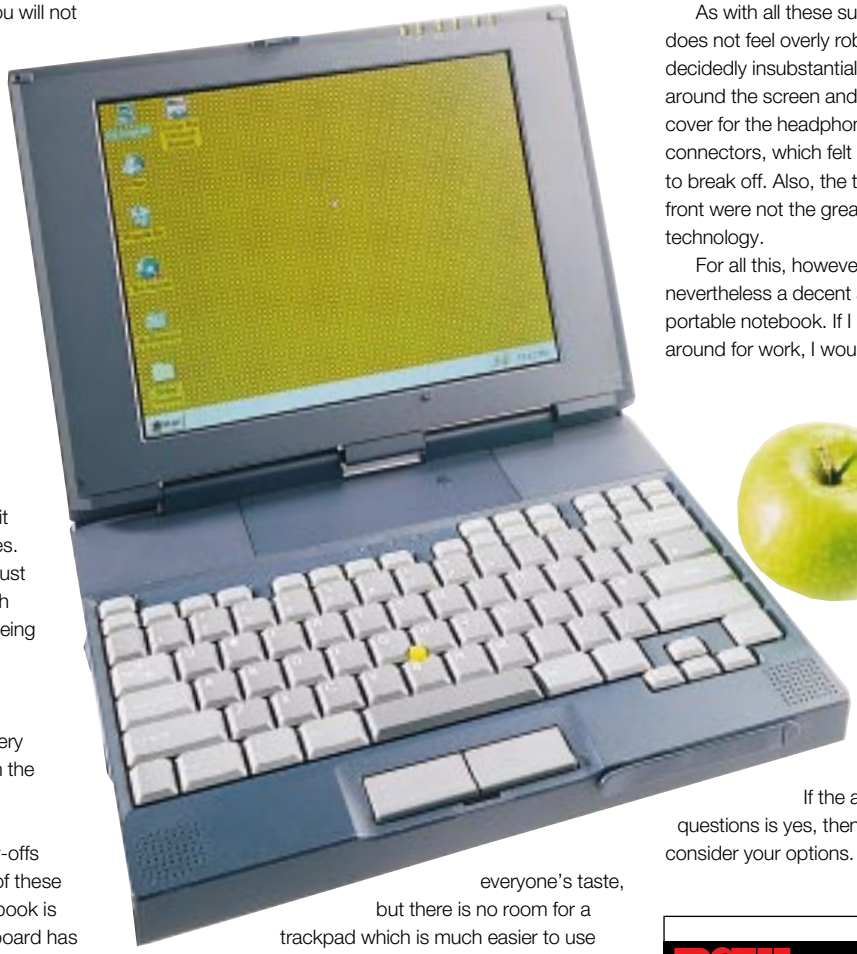
Opti has imported the Talisman from Japan, where it is made by PCPI Technologies. It certainly is tiny, measuring just 23.4 x 17.2 x 3.2cm, although the screen is a decent size, being 8.4in across, which makes it considerably larger than the Libretto's 6.1in screen. And without the AC adapter it is very light, weighing just 1.2kg with the batteries.

However, as with any miniaturisation, there are pay-offs involved. The most obvious of these is the keyboard. As the notebook is just 23.4cm across, the keyboard has been shrunk to fit. It is larger than the keyboard on the Psion Series 5, for instance, but then, the notebook is going to be used in a slightly different way.

If you have a full version of Windows and all the applications that you would normally use, such as Word, you do need to be able to type properly on it. For a touch typist though, the keyboard does take some getting used to because the keys are so close together, you cannot let your fingers hover over the keys without them falling beyond the letter keys. But if you keep your hands higher than normal and dive for the keys as necessary, you can overcome this problem.

The keyboard itself is shallow and quite soft to the touch, but given that you have to adopt a new typing style this is not too much of a worry. You would not want to use this keyboard for long, but it is quite adequate for email, memos and the odd letter. If you need to type a lot you can always attach a full keyboard via the PS/2 port.

The mouse is a touchpoint which lurks in the middle of the keyboard. These little sticks are not to everyone's taste, but there is no room for a trackpad which is much easier to use than the mouse that flicks out from the side of the OmniBook 800.



Connectivity should not be too much of a problem. There are three Type II PC Card slots (or one Type II and one Type III slot) so you can fit an external CD-ROM drive to load software, VGA, serial, parallel and PS/2 ports, and also a proprietary slot which takes the external floppy drive. There is also an IrDA port and headphone and microphone jacks. But there is no way of connecting this to a docking station, which would have made the Talisman far more appealing for general use.

The general specifications are about the same as many of the other very small notebooks (particularly the Libretto). It has a P120 with 24Mb of RAM and an 810Mb hard disk, so compared to many notebooks it is a little slow. But then, for this type of machine where you are extremely unlikely to use it for presentations, that does not matter particularly.

The unit is powered by two small 1200mAh Lithium Ion batteries which should last around two hours, yet they are still light enough to keep the weight down. An AC adapter is also provided.

As with all these sub-notebooks, the Talisman does not feel overly robust. In fact, it feels decidedly insubstantial, especially in the casing around the screen and in the delicate rubber cover for the headphone, microphone and floppy connectors, which felt as though it would be easy to break off. Also, the two tiny speakers at the front were not the greatest thing in audio technology.

For all this, however, the Talisman is nevertheless a decent attempt at an ultra-portable notebook. If I had to carry a notebook around for work, I would probably want this one rather than something huge and heavy.

Before you buy, you need to consider a few things: whether you need a full version of Windows 95 or whether a CE 2 machine would do instead; will you need to type a lot; and do you need it for presentations?

If the answer to any of these questions is yes, then you should carefully consider your options.

Adele Dyer

PCW Details

Price £1,526.33 (£1,299 ex VAT)

Contact Opti 0181 507 1818

System Reviewed P120, 24Mb RAM, 800Mb HD, 8.4in screen.

Good Points Extremely small and light.

Bad Points Keyboard and screen are too small for comfort.

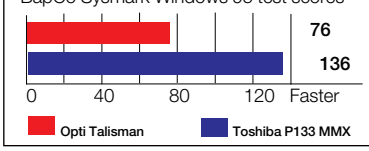
Conclusion Cute, but needs refinement.

★★★☆☆

Performance results

VNU LABS

BapCo Sysmark Windows 95 test scores



p144 ➢

Hardware

Choice Ultralite Rodéo 5000

Horsepower heaven... The fastest mobile PC chip going gives this notebook a real kick.

Last month, in *First Impressions*, we reviewed the first of the new crop of 266MMX notebooks, with models from Compaq and Gateway. This Choice model is another of the same ilk, a desktop replacement notebook with the fastest mobile PC chip going.

The 266 processor is the faster version of Intel's Tillamook chip which it released last autumn. It uses the 0.25 micron process now being used to manufacture all of Intel's new processors and runs at 1.8V, a lower voltage than previous processors, which should help to make your battery last longer.

In this instance, the processor is mounted on a card known as a mobile module which contains the L2 cache and part of the chipset. The idea of putting the chip on a card is to allow easier upgrading, although just how easy it is to get these modules in and out varies from notebook to notebook. This gives your machine a much longer lifespan because you can upgrade the processor, RAM and hard disk, to keep you up to date with continually-enlarging applications.

The Ultralite Rodéo can actually be upgraded to take the new PII mobile chips that Intel will be releasing in April. These new processors are being manufactured to sit on a mobile module and should be significantly faster than the P266MMX chips. However, there are still worries about the heat they will generate and the power they will consume. Intel is stating figures of around 8W on the Mobile PII, compared to around 4W on the Tillamook.

The Ultralite Rodéo has a fairly meaty spec: P266MMX with 512Kb of L2 cache, 64Mb of RAM and a 4Gb hard drive as standard. It also has a 14.1in XGA TFT screen which is, theoretically, the largest screen you can fit in a notebook and, as the equivalent of a 15in monitor, should be quite enough for your own use and for giving presentations. It also holds a CD-ROM and a floppy drive simultaneously in two bays either side of the notebook, so you do not have to spend your life swapping them. Both drives are removable and you can change the 20x CD-ROM drive for a DVD drive when available.

Otherwise, however, the limited modularity does have its drawbacks. For example, on the model we saw, none of the bays will take a second battery so you cannot boost the amount of time you can work without changing the batteries, which some users may find limiting. However, there is the option to be able to fit a second battery if you want one.

As far as connectivity is concerned, the Ultralite Rodéo has just about everything you could want. In addition to the usual serial, parallel, PS/2, IrDA and PC Card slots supporting CardBus, there is one USB port (as on an increasing number of notebooks).

The modem is an internal 56K model which is flash-upgradable so you can adjust it to take account of new standards as they are introduced.

Other ports make this notebook ideal for presentations. There is a TV-out port so you can show your presentation on a television set, which is often more convenient when presenting to large numbers of people. Likewise, the Trident Cyber 9397 3D graphics can draw on the power of 4Mb of SGRAM so you can plug the notebook into a monitor and drive it at 1,280 x 1,024 in millions of colours — again, a good solution when presenting to a group. The notebook screen can display a maximum resolution of 1,024 x 768 in thousands of colours.

The sound isn't bad compared with that of many notebooks. The bass isn't wonderful, as you might guess, but the treble held up tolerably well and the sound created by the two large speakers on the front was loud enough for most purposes. There are also headphone, microphone and line-out jacks for connecting external speakers.

However, by far the most impressive thing about this notebook was its speed. The nearest comparable spec we have seen in another notebook was that of the Gateway Solo 9100 reviewed in last month's *PCW*. This also had a P266MMX with 64Mb of RAM, yet only managed a rather measly score of 171 compared with this Ultralite's 214.

The Rodéo 5000 is slightly more expensive than some of the Gateways, but if speed is your prime consideration then the Choice notebook must still be recommended. In other respects, too, it is sufficiently well-featured and well-specified to satisfy most users.

Adele Dyer

PCW Details

Price £3,876.33 (£3,299 ex VAT)

Contact Choice Systems 0181 993 9003

System Reviewed P266MMX, 64Mb RAM, 4Gb HD, 14.1in screen.

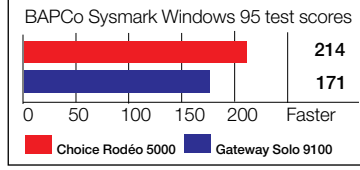
Good Points Excellent performance.

Bad Points Slightly more expensive than other machines of the same spec.

Conclusion A good buy.

★★★★☆

Performance results



p146 ➢

Hardware

ADI MicroScan 5GT

This Trinitron monitor gives bright, vibrant colours but is not the most robust piece of kit.

Sony invented Trinitron in the sixties. It has been licensing the technology to Mitsubishi, which uses it under the Diamondtron name in its own monitors and in the tubes it makes for others. However, Sony is now making tubes for other people and so a Trinitron tube has turned up in the MicroScan 5GT.

The difference between Triniton and FST, which is used in the vast majority of monitors, is in the grille which holds the phosphors in place. FST tubes use a "slotted mask" technique which arranges the grille in blocks, rather like bricks in a wall. Trinitron has long, narrow slits running from top to bottom of the screen which lets far more light through, making for a brighter and more vibrant screen.

But the grille is less stable than an FST monitor's, so two tiny wires run right across the screen to hold it all in place. These wires are just visible, especially on a white background, and some users may find it irritating.

The other downside is that a Trinitron is a rather delicate creature, reacting badly to knocks,

with the display shaking alarmingly. It is also affected by electrical interference so you cannot put speakers on the sides of this monitor, or even near it, without it getting the jitters.

The model we saw wasn't bad as Trinitrons go. Used with an ATI 3D Rage Pro graphics card with 4Mb of VRAM it was able to display a top resolution of 1,600 x 1,200 in 256 colours at 70Hz, although this resolution makes everything too small to read on a 17in monitor. Reduced to 1,280 x 1,024 it could display 24-bit colour at 85Hz and at 1,024 x 768 it ran 32-bit colour at 92Hz. It has dual input, to let you use both D-Sub and BNC connections for connecting two machines at a time. The viewable area is 16in. The colours were excellent but moiré occurred at higher resolutions. The controls were too limited for our liking and there was some distortion at 1,024 x 768 on the left edge of the screen.

Adele Dyer

PCW Details

Price £410.08 (£349 ex VAT)
Contact ADI 0181 236 0801 www.adi.com.tw
Good Points Bright and vibrant colours.
Bad Points Some distortion at one edge.
Conclusion One of the cheapest Trinitron monitors available. A real bargain.
★★★★☆

Viewsonic ViewPanel

Let's twist again, for portrait or landscape display. A bright idea, but clocking seems to be a bit off.

Whenever a new technology comes along, every manufacturer has their own version to offer. Not that they expect to sell a great number; just that they now *have* to offer it to complete their range. Viewsonic concentrates on the budget end of the market and sells most of its monitors to systems integrators, so it's surprising to see it selling a flat-panel. Viewsonic does not make panels itself, so this one is made by Sharp. It has a diagonal viewable area of 15in, making it one of the larger screens available, and runs at 1,024 x 768 in 16-bit colour.

When setting up the monitor we had a few problems with the clocking. Flatpanel displays often have problems syncing-in to the signal from the video card and displaying it clearly at the right refresh rate. Mis-clocking on the screen appears as bands of darker colour which make strips of characters or icons appear darker and less clear than they should. As a result, the ViewSonic, like most flatpanels, has a tuning control to correct the problem, but we had trouble getting the tuning right. The manual suggests that the monitor should be run at a refresh rate of 60Hz, as is normal for panel

displays, but at this rate adjusting the tuning only seemed to exacerbate the problem. We had to increase the refresh rate to 75Hz and retune before it disappeared completely. But once this problem was ironed out, the monitor was quite reasonable although it still suffered from some drop-off of luminosity in the top right-hand corner.

A nice touch is that the panel is one of only two we know of that swivels to display the screen in portrait mode. The panel comes with a CD of software which lets it do this. Unfortunately the software only works with up to 16 different graphics cards and as we did not have a machine available with the correct graphics card, we could not test this functionality.

Adele Dyer

PCW Details

Price £1,526.33 (£1,299 ex VAT)
Contact Viewsonic 0800 833648 www.viewsonic.com
Good Points Swivel to portrait.
Bad Points Clocking and luminosity problems.
Conclusion Not a bad monitor for the price, but there are better panels available.
★★★☆☆

p151 ➢

Hardware

Lexmark Colour Jetprinters 5000 & 5700

Home office or SME, take your choice from these two new colour inkjets.

Lexmark has added two new colour inkjets to its range. The CJ5000 is aimed at home office users, has a maximum resolution of 1,200 x 600dpi and, without an output tray, delivered its output directly to our desktop. The CJ5700, with its top resolution of 1,200 x 1,200dpi, is geared more towards the SME (small to medium enterprise) environment.

Windows 95 installation of the printers was easy and the operating system detected each on startup. Both printers are similar-looking, the only noticeable difference being in the paper output trays. The only control on either machine is a single paper advance button; all other operations are initiated from the PC. The two ordinary cartridges (CYM and black) and the photo ink cartridge (light cyan, light magenta and black fitted instead of the black cartridge) fit into either printer and are colour coded. Unused cartridges are stored in a small container bundled with each printer.

Neither machine performed particularly well printing business graphics. On ordinary paper the colours were washed out and bled through rather than sitting on top of the sheet. There was evidence of white in our solid blocks of colour. Horizontal banding was evident and particularly obvious in areas of black printed by the 5000. The 5700 was unimpressive when rendering pink, orange and brown Pantone squares.

Increasing the quality to "high" and using Lexmark's coated paper improved matters. Black areas were solid and unstreaked and we lost all evidence of horizontal banding. Although there was still evidence of stepping, in our graduated fades the CMY and RGB colour blocks were clean and pure. The only slight disappointment was with the blue rectangle, in which both printers were laying down slightly too much magenta: as a result, the colour was veering towards a rather attractive purple. At this "high" resolution, the printers' primary downfall was with their handling of areas of 50 percent black: using both process black and CMY composite to produce this tone we got a chocolatey-brown, not at all the grey we had hoped for. Both printers coped well with the inverse hairline on the office and coated papers at both 600 and 1200dpi, which indicated accurate ink placement.

Both handled full-page A4 photography well, although the colours were richer on the 5000 with its slightly lower resolution of 1,200 x 600dpi. Light-to-dark transitions in sky colour were smooth and the variance in the foliage of a forest scene demonstrated a wide range of greens. As in all cases of printing at a resolution higher than 600dpi "quick print", the high-resolution 1,200dpi print on Lexmark's photo paper using the photo cartridge took 4mins 45secs longer to appear on the 5700 than the 5000. We were disappointed that the black border on the image produced by the 5000 looked cracked and, rather than being a solid block, was characterised by thin white lines where the paper showed through.

The CJ 5000

While both printers produced excellent deep black text with clearly defined edges and minimum feathering on photocopy paper at a rate of five word-processed pages, there were slight variations in the quality of their "quick" and "high" quality settings. On normal office paper, taking 1min 44secs to complete five pages in "quick" mode, the 5000 produced output of a decidedly lower quality than that presented by the 5700 in just over a minute. We were surprised to find that both produced lower-quality output at their best setting with a horizontal resolution of 1,200dpi, than they did at their default 600dpi setting.

The CJ5700

Although darker than that produced in "quick" mode, the ink laid down was not as dense as that produced at the "normal" 600dpi resolution. Both printers managed to print text as small as 4pt with great clarity in all settings, and we were again surprised to find that at this size, the "quick" setting was the easiest to read.

Neither printer had difficulty in reducing our large Excel worksheet to fit onto a single A4 page. Both produced fairly feint characters at the "quick" setting but in neither case could we see the difference between "normal" and "high" resolutions, so we felt that using the better-quality setting would not be worth the extra time it would take.

Nik Rawlinson

PCW Details

Lexmark Colour Jetprinter CJ5000

Price £179 (£152.34 ex VAT)

Contact Lexmark 01628 481500
www.lexmark.co.uk

Good Points Great-looking photo output.

Bad Points Normal-quality print better than high-quality setting. Business graphics.

Conclusion Competitively priced and worth a try.

★★★★☆

Lexmark Colour Jetprinter CJ5700

Price £229 (£194.89 ex VAT)

Contact As above

Good Points Affordable 1,200 x 1,200dpi printing.

Bad Points As above

Conclusion Slightly disappointing when compared to the cheaper CJ5000.

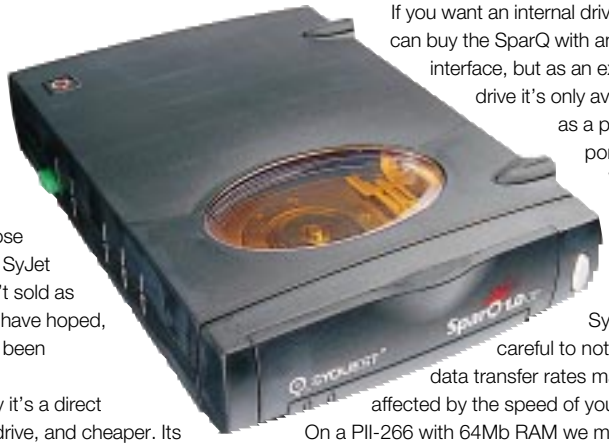
★★★☆☆

p153 ➢

Hardware

SyQuest SparQ

This SparQy little unit is competitively priced but the parallel-port version lacks some drive.



It is SyQuest's proud boast that it virtually invented the removable storage market, so the recent success of Iomega with both the Zip and Jaz drives has really put SyQuest's nose out of joint. The 1.5Gb SyJet was delayed and hasn't sold as well as SyQuest might have hoped, so now the SparQ has been launched.

In terms of capacity it's a direct competitor to the Jaz drive, and cheaper. Its removable cartridges, virtually identical externally to those used in the SyJet, hold just over 950Mb — SyQuest claims 1Gb but counts 1Mb as one million bytes. With this space available you'd expect to be able to use it as an extension to your hard disk and SyQuest is marketing the drive on its extra storage capacity, so you can save large and little-used files or applications on a SparQ drive rather than on your own hard drive.

If you want an internal drive you can buy the SparQ with an EIDE interface, but as an external drive it's only available as a parallel-port device. We tested the parallel version. SyQuest is careful to note that data transfer rates may be affected by the speed of your PC. On a PII-266 with 64Mb RAM we managed to transfer files to the drive at speeds of around 0.6Mb/sec: this is certainly fast enough for a backup device but a bit below SyQuest's claimed 1Mb/sec. Opening a 10Mb TIFF from the drive took around a third longer than from our hard disk. While in this instance it's only a ten-second difference, it would be more noticeable if you were opening multiple files or working with larger images.

Copying data to and from the SparQ really seems to put a strain on the PC. Even mouse movements were jerky as we copied large files, and our word processor became unusably slow until the transfer was finished. If you are merely using it as a backup or archiving device this is not too much of a problem, but not if you want to run applications from the disk. Software is included to allow you to perform unattended backup as well as to download web sites for off-line browsing.

John Sabine

PCW Details

Price £169.20 (£144 ex VAT). Cartridges £35.25 (£30 ex VAT) each or £84.60 (£72 ex VAT) for a pack of three.

Contact SyQuest 01189 880207 www.syquest.com

Good Points Price: extremely competitive.

Bad Points Performance: transferring 1Gb really stretches the parallel interface.

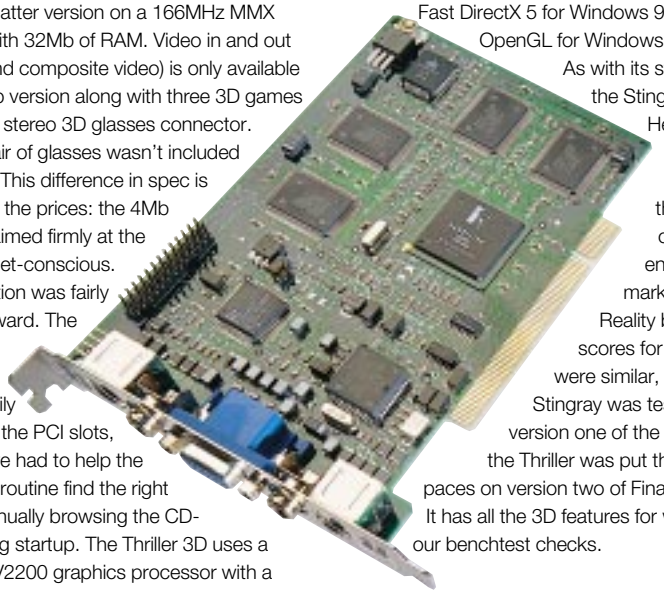
Conclusion If you want to work with large files frequently, you'll need a SCSI device.

★★☆☆☆

Hercules Thriller 3D

A good 3D graphics card that will fit into a PCI slot — but don't expect too many fast thrills.

This dedicated 3D card sits in its own PCI slot next to your 2D graphics card and is connected to it internally. The Thriller 3D comes with either 4Mb or 8Mb of SGRAM. We tested the latter version on a 166MHz MMX machine with 32Mb of RAM. Video in and out (S-video and composite video) is only available on the 8Mb version along with three 3D games titles and a stereo 3D glasses connector. Sadly, a pair of glasses wasn't included in the box. This difference in spec is reflected in the prices: the 4Mb version is aimed firmly at the more budget-conscious.



Installation was fairly straightforward. The half-sized card slotted easily into one of the PCI slots, although we had to help the installation routine find the right files by manually browsing the CD-ROM during startup. The Thriller 3D uses a Rendition V2200 graphics processor with a 230MHz RAMDAC and has software MPEG. It is capable of supporting a maximum resolution of 1,600 x 1,200 at a refresh rate of 85Hz. Hercules is heavily promoting the card's ability to support Fast DirectX 5 for Windows 95 and OpenGL for Windows NT.

As with its stablemate, the Stingray 128/3D, Hercules is aiming this card at the high end of the home entertainments market. Final Reality benchtest scores for both cards were similar, except the Stingray was tested on version one of the test while the Thriller was put through its paces on version two of Final Reality. It has all the 3D features for which our benchtest checks.

Lynley Oram

PCW Details

Price 4Mb £116.33 (£99 ex VAT); 8Mb £210.33 (£175 ex VAT)

Contact Imago Micro 01635 294300 www.hercules.com

Good Points Supports DirectX 5 and OpenGL. Smooth textures. Good colours. All 3D features.

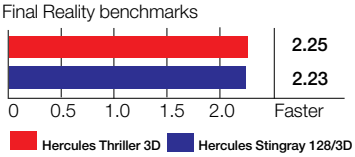
Bad Points Performance not as fast as was expected — it's not really suited to machines of a lower specification.

Conclusion A good all-rounder.

★★★★☆

Performance results

Final Reality benchmarks



p154 ➢

Hardware

HP ScanJet 6100C

Scan to your heart's content, from large sheets down to something the size of a pinhead.

Aimed firmly at the business end of the scanning market, this scanner does its job at speed. It reviews black-and-white line art in just 12 seconds and scans with a single pass at 600dpi in no more than 13 seconds almost silently, which makes it ideal for offices and copy bureaux where a rapid turnaround is vital. Even dealing with colour photographs increases the scanning time to just 17 seconds. An optional 50-sheet automatic document feeder increases throughput still further.

As expected, this device is fully TWAIN compliant so using it directly from many common graphics packages is easy, but the excellent DeskScan II software means that it can also be used as a standalone device. Scanning resolution is selected from two drop-down menus by choosing the type of input (anything from line art to a photo) and how it will ultimately be displayed. Options range from "screen" to a number of common printers. The intuitive software then calculates the most appropriate resolution. These settings can be customised to increase the maximum optical resolution of 600dpi to 2,400dpi interpolated. Using a standard Agfa scanning target to conduct our tests, a histogram analysis demonstrated recognition of 20 out of a possible 22 shades of grey and only a 4 percent loss of colour recognition, leading to a definition loss in regions of shadow but complete acknowledgement of areas of highlight.

Placing a document in the scanner and clicking "acquire" in a graphics package launches the TWAIN application and causes the software to automatically select only the relevant part of the scan. Connected via a bundled SCSI interface card this scanner also handles 35mm slides. A zoom function enables it to scan from a maximum document size of 8.5ins x 14ins to an area almost too small to be seen by the naked eye. Acrobat 3.0 and Corel Web.Graphics suite are bundled.

Nik Rawlinson

PCW Details

Price £703.83 (£599 ex VAT)

Contact Hewlett-Packard 0990 474747 www.hp.com

Good Points Quick. Easy to use. Outstanding value for money.

Bad Points Large footprint.

Conclusion Everything a scanner should be.

★★★★☆

Microtek 6400XL

At last! An A3 scanner that won't cost you an arm and a leg, and it's got a nice footprint, too.

The cost of an A3 scanner used to be sky high, but this 6400XL is well within the reach of many small-business users. The advantage of being able to scan open magazines or tabloid publications is supplemented by the ability to batch-scan up to ten 3.5in x 5in photographs. With a generous selection of bundled software including OmniPage Lite for OCR, Painter 5 and the SilverFast colour management package, all types of text, images and line art can be scanned for immediate incorporation into leading software packages.

The results produced in our tests showed that the 6400XL managed to detect 20 shades of grey in a scale of 22, ranging from pure black to 100 percent white. Using an Agfa IT-8 test target it was able to detect around 90 percent of the tones on a 256-colour card. This indicated that although there was no clipping, there was a slight loss of definition in the shadows and highlights. Even though there was an expected minor quality deterioration when scanning text as small as 6pt at the maximum optical resolution of 400 x 800dpi, the interpolation capabilities of the software smoothed every character to produce a well-defined set of clean, clear edges, even at high magnification. The resulting interpolated resolution of 6,400 x 6,400dpi produced characters of comparable quality to the original source.

The drivers installed easily and although it involved checking our IRQ settings and possibly moving a jumper, the excellent manual easily guided us through seating and configuring the SCSI card. Operation was a quiet but lengthy process. In our tests a 400dpi A4 scan, which previewed in just 17secs took 2mins 15secs to complete. Using it to its full capacity, by scanning an A3 document, increased the preview time to 26secs and the final scan took 5mins 40secs.

Nik Rawlinson

PCW Details

Price £1,408.83 (£1,199 ex VAT)

Contact Computers Unlimited 0181 200 8282 www.microtek.nl

Good Points Value for money. Compact for an A3 scanner.

Bad Points Disappointing colour registration.

Conclusion Puts A3-size scanning within the reach of all.

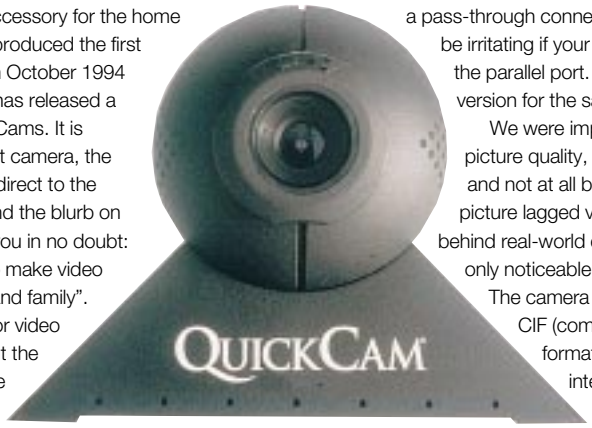
★★★★☆

Hardware

Connectix QuickCam VC

Talk face to face with your friends on the phone. At this price, you can put the VC on your PC.

Cameras that attach to your PC (tethered cameras) are quickly making the transition from business tool to must-have accessory for the home PC. Connectix produced the first digital camera in October 1994 and since then has released a variety of QuickCams. It is pitching its latest camera, the QuickCam VC, direct to the home market and the blurb on the box leaves you in no doubt: "Use your PC to make video calls to friends and family".



VC stands for video conferencing but the camera can take still photos, too, and send video emails. It ships with Connectix VideoPhone 3.0 for video conferencing which conforms to the H.324 standard for modem-to-modem connections over a standard phone line, and with Microsoft's NetMeeting for video conferencing over the internet.

This is one of the most inexpensive cameras we've seen. We reviewed the parallel-port version which installed easily enough but doesn't have a pass-through connector. This could be irritating if your printer does use the parallel port. There is a USB version for the same price.

We were impressed with picture quality, which was sharp and not at all blocky. The picture lagged very slightly behind real-world events, an effect only noticeable when talking.

The camera conforms to the CIF (common interchange format) standard for international video-conferencing which sets the resolution at 352 x 288 pixels, and at this size you will get typical frame rates of 15fps. Resolutions of up to 640 x 480 are available but not for video conferencing. You can of course record your video emails at this resolution, which will give you a frame rate of around 12fps.

Sound quality was exceptionally good, with no apparent robotic "twang" and very little background noise picked up.

However, we did have a couple of gripes. Without compression the files take forever to upload, and it's not clear from either the software interface or the documentation that compression is required or even what format should be used. Annoyingly, sound can only be added after the video has been recorded so you can only really send a sort of commentary.

Lynley Oram

PCW Details

Price £111.63 (£95 ex VAT)

Contact Ingram Micro 01908 260422
www.connectix.com

Good Points Price, picture and sound quality.

Bad Points Sound can only be added to video emails after recording the picture.

Conclusion Suitable for home use.

★★★★☆

Amacom Flip Disk

Looks a bit like a scorpion but you can hold it in your hand. The sting in the tail is its price.

"Get a Flip Disk, not a slipped disk" says Amacom and when you see their smart blue Flip Disk you can see why. Weighing just 188g and fitting easily into your hand, the Flip Disk is extremely portable. With its complementary padded carrying case it should slip into any bag, while at the same time offering the added bonus of data protection. If you store files and applications on the Flip Disk and remove the drive when your laptop is in transit, theft of the PC will not result in the all-too-common disaster of lost files.

A major advantage of an external hard drive is that it allows you to carry large portions of your data about with you. You can transfer files from a laptop to a desktop PC without using a floppy or Zip disk or LapLinking both machines together. Instead, with the Flip Disk you can simply connect to the PC Card slot of a notebook, using its parallel interface to connect to the desktop.

In our tests the drive attained a maximum data transfer rate of 1.7Mb/sec utilising the PC Card interface and 533Kb/sec when connected to our desktop's parallel port.

You do not need batteries for the drive as it draws all its power from the notebook or from a lead attached to the desktop machine's keyboard or mouse port, and a bundled pass-through parallel cable will let you continue using your printer while the drive is still in use.

Backed by a 12-month RTB warranty and free lifetime technical support, installation of the Flip Disk was simply a matter of plugging it in and installing the appropriate DOS, Windows or OS/2 drivers.

We were disappointed to find that the stated maximum capacity of the Flip Disk was only theoretical. Using it as a backup device in much the same way as a tape streamer and compressing the data, we would have achieved the high capacities advertised. However, by using it as a conventional hard drive we could expect to store around 50 percent less, which makes this a pricey storage option.

Nik Rawlinson

PCW Details

Price From £411.75 (£350 ex VAT) for 2.8Gb (1.4Gb compressed), to £705 (£600 ex VAT) 8Gb (4Gb compressed).

Contact Amacom 0181 993 7373
www.amacom-tech.com

Good Points Small. Light. Easy to use.

Bad Points Expensive for its capacity.

Conclusion You could buy cheaper but probably not smaller.

★★★☆☆

p156 ➢

Software

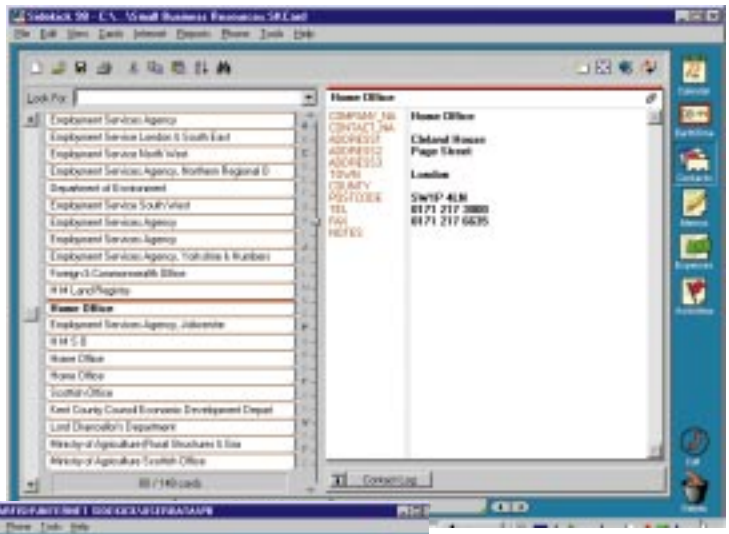
Starfish Sidekick 98

Personal Computer World Recommended

The best a PIM can get... This upgrade goes for subtlety rather than impact in its new features.

A PIM (personal information manager) is a combination of address book, diary, appointment calendar, scrap of paper, old beer mat or the back of your hand where you have scrawled things to do. PIMs do some, all, or more than these tasks. They handle tasks in various ways, with different degrees of efficiency. Whichever PIM you settle on depends on your requirements. Sidekick is probably the best you can get and is especially valuable for users of the internet or corporate intranets.

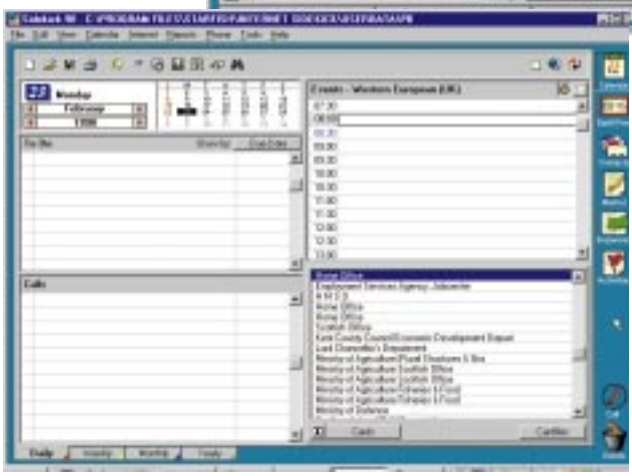
What makes Sidekick so good is its customisability. The trouble with some PIMs is that you are required to enter information in form-like fields, which often places a restriction on the information you can enter. For instance, you may be provided with only one field for an email address, whereas your contact might have accounts with more than one service provider; one at work and another at home, say.



With Sidekick you can incorporate all types of contact information. Indeed, it will handle *any* information, from a price list to wine-tasting notes

You can view all your activities in a list, whether they are calls to make, appointments, to-do or scheduled internet events. There is one module for keeping track of your expenses and another to show the time in various parts of the world.

Sidekick does what it is supposed to do fairly comprehensively so one rather expects new features and enhancements to be in the category of bells and whistles rather than anything likely to get your pulse racing. And this is the case with Sidekick 98. Among the improvements is a new-look interface, but don't worry, nothing has dramatically changed — just new graphics and a new toolbar. The Earthtime module now has an option to display analogue or digital formats on its clocks. There is a more colourful map with enhanced topographical graphics and the world holidays on the Calendar have been updated.



Sidekick has a calendar which can be used to display appointments, to-do's and other tasks in daily, weekly, monthly and yearly views

Perhaps the most significant enhancement is to importing and exporting. Sidekick 98's Import Wizard lets you import data from Microsoft Outlook 97, Schedule+ 7.0 and Lotus Organizer 97. You can import and export files in various formats: dBase, Spreadsheet Data (DIF), ASCII, comma-delimited and tab-delimited text. You can open your Windows Address Book cardfile in Sidekick 98. This new feature also supports Microsoft Outlook 97, Outlook Express and Internet Mail, although you must have Microsoft Internet Mail 3.02 or Outlook Express to use this feature. Similarly, you can now import calendar files from Microsoft Outlook 97, Schedule+ 7.0 and Lotus Organizer 97.

This flexibility extends to getting up-and-running: Sidekick 98 automatically links to Eudora, Netscape and Microsoft Exchange, Outlook and Windows address books; while export/import capabilities to ACT 3.0, Lotus Organizer 97, Microsoft Outlook 97 and Schedule + 7.0 have been significantly expanded.

If you have ever wanted to share calendars and cardfiles on the net or across an intranet, you will welcome the Web Publisher feature which lets you create fully formatted and linked HTML files to do just that. You can automatically publish professional-quality and consistent calendars and contacts to the web or the company intranet.

Another enhanced feature is TrueSync. If you use a 3Com PalmPilot 1000 or 5000 PDA you will embrace Sidekick 98, because with the new TrueSync feature you will be able to automatically synchronise data between it and your PC. Currently, Sidekick 98 will synchronise with the Rolodex REX card and the PalmPilot, and will support Microsoft Windows CE 2.0 on its release.

Nothing much else is new in terms of general enhancements except support for vCard and vCalendar which will enable users to drag and drop vCard and vCalendar objects into Sidekick's Contacts and Daily Calendar views, or to drag and drop URLs from Sidekick into their web browser.

These enhancements to Sidekick will be welcomed by existing users, for whom they are intended. The improved importing and the TrueSync technology may be welcomed by those considering the switch to another PIM or by those who want easy transfer of data from their PIM to the PalmPilot or Windows CE PDA. Otherwise, this upgrade is not wildly exciting.

Paul Begg

PCW Details

Price £39.99 (£34.03 ex VAT). Upgrade from Sidekick Internet and Sidekick 2.0, £24.99 (£21.27 ex VAT) on 01494 455561

Contact Starfish Software 0181 875 4455 (01494 455561 for upgrade) www.rmg.co.uk

System Requirements Windows 95, Windows 98, Windows NT 4.0 and higher.

Good Points Sidekick's customisability is still its greatest strength.

Bad Points Nothing bad, but it occupies a lot of disk space for what is ultimately a minor utility.

Conclusion Still the best PIM.

★★★★★

p158 ➢

Software

PageMill 3.0

BETA

Abobe's easy-to-use web authoring package now comes with site management and Java.

PageMill 2.0 is among the most successful web authoring products that emphasises ease-of-use over features. Version 3.0 aims to be a more complete tool, with integrated site management and Java support along with a generous bundle of web-ready graphical content.

The heart of PageMill is a visual page editor with a clean interface. A toolbar gives access to text formatting and basic HTML elements including tables and forms.

There is a tabbed inspector window which enables you to edit the properties of the current element. You can change the background image and default text size from the Page tab in the Inspector. A strong feature is the pasteboard window which acts as a temporary store for any kind of page element, like a block of text or an image.

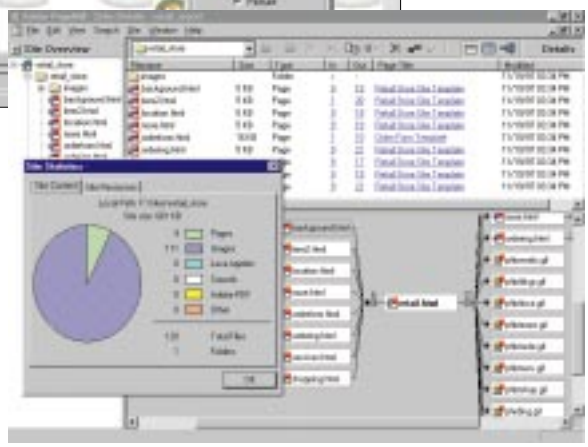
Elements are moved to and from the pasteboard by drag-and-drop. Setting up hyperlinks is easily done by selecting some text or an object and entering the web address into a "Link to" box. The editor is an MDI (multiple document interface) application and, if you open several pages at once, you can also create links by dragging and dropping between pages.

Creating frame-based pages is easy, too. A menu option lets you split a page into frames, horizontally or vertically. You can also add, remove and resize frames by dragging the mouse. Behind the scenes, PageMill automatically updates the frameset container document.

The PageMill editor has three modes. Edit mode is the default view, for visual editing. Source view shows the raw HTML code in a basic editor and Preview mode displays the page as it should appear in a web browser, complete with active hyperlinks, Java applets and ActiveX controls, although it cannot run JavaScript. Java capability is thanks to Sun's JRE (Java Runtime Environment) which is installed with PageMill. Java applets optionally load and run even when a page is open in edit mode, although in the beta we found this caused performance problems.

A great feature is that you can display the Java console, which lets you view a log of any Java activity or errors. PageMill's property inspector is ideal for a Java applet, showing its parameters in a grid. You can add and amend these parameters without needing to open the HTML source and then click a reload button to refresh the applet to see the effect of your changes. Another option is to use Internet Explorer (IE) as the built-in preview browser. Both IE and Netscape appear on the menu in any case, for quick testing of the current loaded document, and you can add other browsers.

Site management is a new and welcome feature. There is a site menu with an option to create or load a site. Unlike Microsoft's FrontPage, which requires a local web server to be installed, PageMill works directly from files, and a PageMill site is essentially a folder on your hard disk. The site contents are displayed in two ways. First, a tree-view listing appears in an overview window. Double-clicking a page in the overview opens it in the editor. There is also an error page, created by PageMill, which identifies problems such as broken links. Second, there is a site details window with two panes. The upper pane shows a list of all the files in the site, the lower, a graphical link view. Again, there are dynamic links so any element can instantly be opened for editing. When you are happy with the site, there is a menu option to upload it, with settings to exclude files or upload only changed pages. A nice feature is that you can check the estimated download times for any page or object to ensure your site remains responsive.



Left PageMill makes good use of an object inspector for visual page editing

Below Site Management the PageMill way, complete with pie chart showing the make-up of your web content

PageMill 3.0 has no wizards for instant page creation but comes with around 30 sample web sites you can customise as needed. On the installation CD is a cut-down Adobe Photoshop, which is an excellent graphics editor, an array of graphics, animations, scripts and Java applets and the O'Reilly web server. You can also obtain a set of fonts optimised for use on the web as a separate product, Adobe WebType, although the snag with these is that they are unlikely to be available on the user's system.

PageMill allows for third-party plug-in components to be installed into the design environment, making this an extensible system, but the value of this depends on how many components actually become available.

As a well-designed package for straightforward web authoring, PageMill is ideal: easy to learn and use, and the new site management features are a simple solution to the problem of organising and uploading pages to the web. For the more ambitious site designer wanting to make use of JavaScript, live database access, or new HTML features like cascading style sheets or Dynamic HTML, PageMill is a disappointment. Java applets and ActiveX controls, on the other hand, are well catered for.

Tim Anderson

PCW Details

Price £92.83(£79 ex VAT)

Contact Adobe 0181 606 4001
www.adobe.co.uk

System Requirements Windows 95 or NT.

Good Points Intuitive graphical editor. Java support. Easy site management.

Bad Points No scripting support. No Dynamic HTML. Not suitable for large or complex sites.

Conclusion Better than ever, but it is still not the cutting edge of web development.

★★★★☆

p161 ➢

Software

Professor Franklin's Instant Photo Effects

Fool your friends into thinking you've got family snaps from the last century, or just tweak for fun.

Professor Franklin's Instant Photo Effects is a home digital darkroom aimed at the home snapper whose knowledge of photography extends to how to put the film in and how to get it out again. It is designed for getting results quickly at the touch of a button.

There are effects categories which appear as 35mm film canisters at the bottom of the editing window. Clicking on these pulls up a length of film on which the options for that category appear. There are six categories: artistic, edges, frames, darkroom, accents and photography. If you want to improve the look of your photos before printing them, Darkroom is the place to start. You'll find tools to improve the brightness and contrast, remove colour casts and make blurred pictures sharper.

There's a selection of bolt-on picture frames, from an ornate gold-leaf job that wouldn't look out of place in the National Gallery, to plastic alphabet letters that wouldn't look out of place on your fridge

This sepia photograph effect gives your picture the "found at the bottom of a Victorian biscuit tin" look

All the tools operate in much the same way. Having selected your category you select one of the options on the film-roll menu and a list of further options is displayed in a window beneath the image area. If you select the colour correction button, the options that appear are more red, less red, more green etc. Clicking one of the options previews the results, full size, in the image window and you then select and apply changes from the menu bar. Some options let you carry out a bit of fine tuning by means of the details button which throws up a dialog box giving you access to additional tweaks.

There's plenty of scope for mucking about. The artistic category includes options for impressionism, painting, drawing, lithographic etching and embossing, and each of these options has around six different effects. The drawing effects include charcoal, colour and black-and-white chalk, pen and ink, pencil sketch and marker. You get a choice of five impressionists, including one I've never heard of (Vuillard), which almost certainly says more about my knowledge of the impressionists than the scope of Professor Franklin's technique.

Some thought has gone into the features and there's much more than the usual collection of emboss filters and greeting-card templates. The Edges category enables you to produce photos with scrappy edges (as if they've been scribbled onto the page). You can make vignettes (oval masks with a faded edge) and Object edges provide variously-shaped masks you can use to crop the image — heart, jigsaw, leaf and stamp.

Accents is a collection of transforming filters including page curl (giving corners the heated roller treatment), lighting effects, drop shadows and pattern textures. My favourite is the antique option from the Photography category. Faded, sepia-toned, covered in scratches and with edges that look like the dog got to them, you'll have no difficulty convincing friends you've been taking pictures since before the war. Photography includes stylise and duotone filters, which are useful, and colour quad and digitise filters, which are not: why would you want to divide pictures into four quadrants and make each one a different colour?

A short toolbar to the left of the image window provides tools for magnifying, selecting, rotating and text. Aside from adding text with nifty drop shadows, Prof Franklin is light on tools for those who favour the freestyle approach in preference to handheld button pushing.

There's a "touchup tool" which provides a dual-function dialog for red-eye, dust and scratch removal, the first of which is a feeble effort: using a brush, you paint over the offending pupils in a chosen colour. There's little point in choosing anything other than black, unless you want to create pictures of freaks with coloured pupils (it's the iris, the bit surrounding the pupil, that's coloured!). There's also no way to modify the selection of the red pixels you want to replace, with the result that many of them are still there when you've finished. And the scratch removal filter? Not as good at taking them out as the antique one is at putting them in.

Franklin won't disappoint those who want to have some creative fun with their photos or produce some imaginative visuals for a newsletter or web site. The simple interface and number of effects filters makes for quick and effective results with very little effort. Total novices might prefer the step-by-step approach of PhotoDeluxe which provides more flexibility if you want to go it alone.

Ken McMahon

PCW Details

Price £29.95 (£25.49 ex VAT), £6 carriage

Contact Guildsoft 01752 895100
www.guildsoft.co.uk

System Requirements Windows 95

Good Points Multitude of "one-touch" filters and effects. Nicely-designed interface.

Bad Points Not much scope for doing your own thing. Red-eye removal is rubbish.

Conclusion A good bet if you know little or nothing but want good results, pronto.

★★★☆☆

p163 ➢

Software

Asymetrix ToolBook II Instructor 6.0

Personal Computer World Recommended

This could be top of the class when it comes to making your own interactive training material.

ToolBook Instructor helps you create interactive computer-based training material for delivery on internal networks, CDs or over the net. If you are a training provider or otherwise involved in education, this product should interest you.

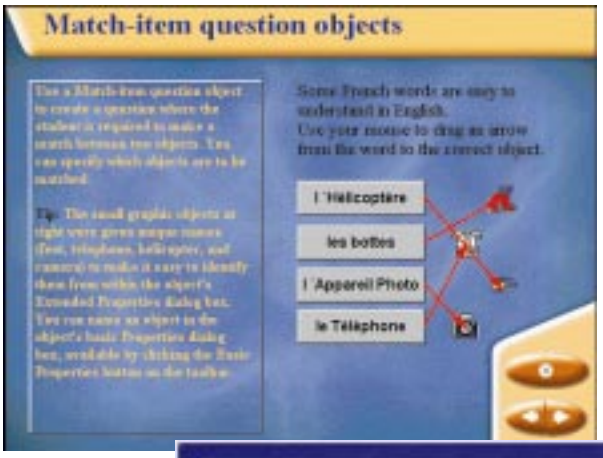
If you are a multimedia developer you can hardly fail to have heard of ToolBook. For almost a decade it has been one of the two most successful multimedia authoring packages (the other being Macromedia Director). Multimedia ToolBook as it was called (back in version 4) was renamed to Publisher in version 5, and the special CBT Edition became Instructor.

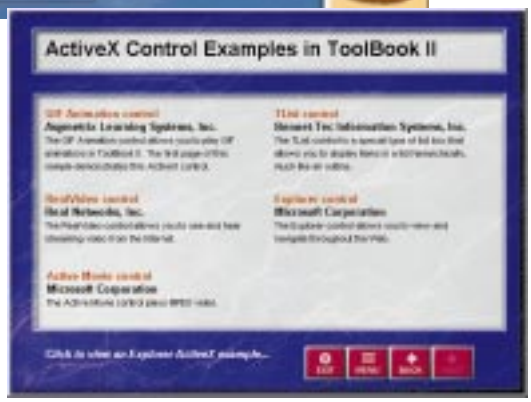
Last year Asymetrix bought one of its largest competitors, Aimtech, producer of IconAuthor and CBT Express, and decided to concentrate on developing authoring tools for online learning as opposed to general multimedia development. This is the first update since that move and it is also the first one with substantial features for developing online learning material.

ToolBook is based on the book metaphor: your applications are books which contain pages (screens). Each page has objects which can be navigation buttons, pictures, drawings or stages on which you can play videos, animations and so on. ToolBook has a powerful programming language called OpenScript (a bit like Visual Basic) which you need to use for large-scale applications. It is not difficult to learn and there is an autoscript facility, a collection of pre-written scripts to perform most common tasks. The language allows access to Windows functions and hardware resources and you can use Visual Basic VBX and OCX controls, too.

Available in the previous version but enhanced in this one, is the ability to save/convert books into HTML pages with Java output. And the new version also supports ActiveX controls which, for example, means that you can launch a web browser and control students' access, and play streaming media (i.e. video and audio).

There are many other improvements to aid productivity. The Page Browser displays thumbnails of pages for re-ordering, adding and deleting, and the Object Browser displays object properties in outline form for rapid amendments.





Top Set up match-item question screens by specifying matching pairs of objects
Above A library of ready-made ActiveX controls and software to support instructional and application design

You have access to more than 1,000 objects for navigation, teaching and assessment tools, including setting student time deadlines, and ways of setting questions and logging student answers beyond the standard multiple choice and boxes to be filled in.

You can use the objects in the catalogues without modification or you can edit them to your requirements. You can also share them for group-work and build catalogues of objects for distribution to other authors.

This new catalogue feature has a profound effect on the way Instructor can be used. Indeed, it makes it a great deal easier, while allowing you to do more than you could with previous versions. It also brings authoring even closer to those who are less into programming and more into education and instruction. It is not programmers and computer developers who will be using this product, but educators and trainers.

Instructor 6.0 is bundled with a number of applications to enable you to prepare material. There is a version of Asymetrix Digital Video Producer (a video editing tool), RealNetworks' RealSystem (for enabling streaming media from an intranet server), Asymetrix Web3D (for stunning 3D graphics) and Interleaf's Jamba Java animation tools. On top of that you get a series of other utilities. One such is Impulse for the ToolBook Plug-in Neuron which provides web-optimised delivery of ToolBook applications, loading only the information relevant to the page displayed, thus improving performance. Another is a new AutoPackager based on technology from InstallShield which makes packaging your media and creating setup programs easy. There are tools for editing bitmap images, colour palettes, icons and cursors, audio files and more.

Although Instructor 6 is now 32-bit and supports Windows 95 and NT, support for 16-bit Windows 3.11 is still available. And for 32-bit environments there is specific support for long filenames, MMX multimedia and the Windows Registry.

Instructor is only one of a number of Asymetrix products in a range of authoring and associated tools. A significant one is Librarian, for managing online courses and distance students. The idea is to deliver learning to anyone, anywhere in the world, with learning applications that can be spread over a number of computers.

This seems to be the way the world of education and training is moving, and Instructor, which of course interfaces perfectly with Librarian, is helping point the way.

Panicos Georghiades and Gabriel Jacobs

PCW Details

Price £2,291.25 (£1,950 ex VAT); educational price £1,145.63 (£975 ex VAT)

Contact Asymetrix 0171 345 1500 www.asymetrix.com

System Requirements Windows 3.1, 95 and NT.

Good Points Very powerful.

Bad Points Learning time. High price.

Conclusion If you make money from selling knowledge/learning and want to survive in a world-wide learning market, you can't ignore this product.

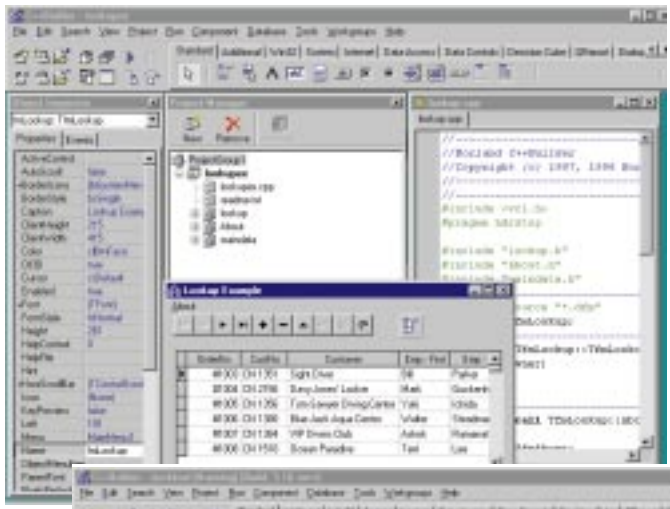
★★★★☆

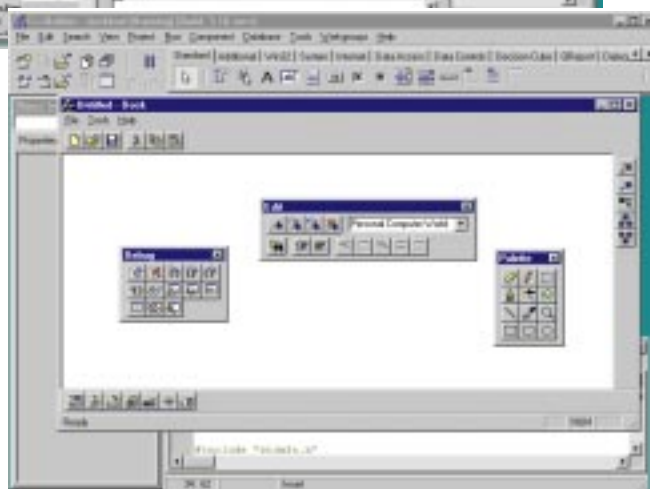
p164 ➢

Software

Borland C++ Builder 3 BETA

Borland's RAD C++ tool catches up with Delphi — but for how long? We check out the beta.





Left C++ Builder looks just like Delphi until you open the editor and see C++ code

Below C++ Builder happily compiled this MFC project, which demonstrates dockable toolbars although warning of dreadful things deep within the MFC code

Delphi is the most productive of Windows development tools, but not everybody likes coding in Pascal, Delphi's language. Borland therefore wrapped Delphi's VCL (Visual Component Library) with C++ header files to create C++ Builder. The result is genuine RAD (Rapid Application Development) for C++: you can build a full-featured graphical interface by drag-and-drop. The BDE (Borland Database Engine) provides integrated database access to both desktop and client-server data.

C++ Builder has an impressive feature list that will tempt more into giving it a try. The VCL is numbered 3.5 and, as that implies, this is more than just Delphi 3.0 for C++. Some features do come straight from Delphi 3.0. Packages are runtime DLLs that let you share code between applications. You can now put VCL code into one or more packages, so only code specific to your application is compiled into the final executable.

Another strong feature is ActiveX support. There is a wizard to convert a C++ Builder component or form into an ActiveX control, for use in other environments such as Visual Basic or Internet Explorer. For deployment, there is support for the CAB compressed file format along with code-signing to reliably identify the control. You can also create automation servers to expose an application's functions via COM.

The C++ Builder interface is little changed but does have useful enhancements. The editor now supports multibyte characters. It also has Code Insight, which provides templates to speed the typing of common statements like try…catch blocks, and tool-tip expression evaluation to show the value of variables or properties when debugging. The debugger has an option to debug DLLs by specifying an executable that uses the DLL. You can see different modules, such as an executable and a DLL, within a single debugging session. Data-watch breakpoints activate when a specific memory address is written to; for example, when a variable changes value. Building an executable is faster, thanks to improvements in the incremental linker, and working with C++ Builder is now closer to Delphi in this respect. The compiler can handle the MFC (Microsoft Foundation Classes) and the Object Windows Library (OWL) as well as the VCL, and there are examples of how to use VCL forms with MFC or OWL code.

C++ Builder has a new version of the BDE with support for Microsoft Access, provided it is already installed on the system, FoxPro .CDX indexes and ODBC 3.0 drivers. Borland recognises that not everyone wants to use the BDE and fewer database components are hard-wired into it. The new TClientDataSet is BDE-independent and is useful both for simple standalone applications and for applications where the user works with a local, disconnected copy of data retrieved from a server. It is also easier for third parties to replace the BDE with an alternative database engine while still supporting the data-aware interface components.

New VCL components include an animation control, a date/time picker, a splitter component and a data-aware rich text component. There is a new group of chart components. TToolbar and TCoolbar offer an Office 97/Internet Explorer look-and-feel. TThreadList is a non-visual component for thread-sage list manipulation.

C++ Builder is now Borland's core C++ product. Borland C++ 5.0, a more conventional C++ product, will not be developed further and neither will the OWL class library. Both are bundled with C++ Builder to assist code migration, and for support of DOS and Windows 3.1 applications.

This is an outstanding package but there are irritations. One is the lack of a class browser. JBuilder has an excellent class browser, and so does Visual C++, a key rival to C++ Builder. Delphi has a poorly-integrated object browser, but C++ Builders have to purchase this as an add-on if required or write their own based on example code supplied. Next, the hybrid Pascal/C++ nature of C++ Builder is a compromise, made worse because it is not synchronised with releases of Delphi. Third, the product range is bewildering and it is a shame that the great decision cube component, a VCL component similar to Excel's pivot table, is only available in the expensive client/server edition. Finally, although C++ Builder is way ahead of Visual C++ as a RAD tool, it is a less productive environment for pure C++ coding.

Tim Anderson

PCW Details

Price Standard £99 (£84.26 ex VAT); Professional £468.83 (£399 ex VAT); Client/Server £1,878.83 (£1,599 ex VAT); Enterprise prices tba.

Contact Borland 01189 320022
www.borland.com

System Requirements Windows 95 and NT.

Good Points The most productive C++ environment. Rich range of components. Supports VCL, MFC and OWL.

Bad Points Pascal underneath. No class browser. Lags behind Delphi in features.

Conclusion The best C++ for rapid development, but Delphi users have no reason to switch. Visual C++ still has advantages.

★★★★☆

p166 ➢

Software

Mathematica 3.0.1

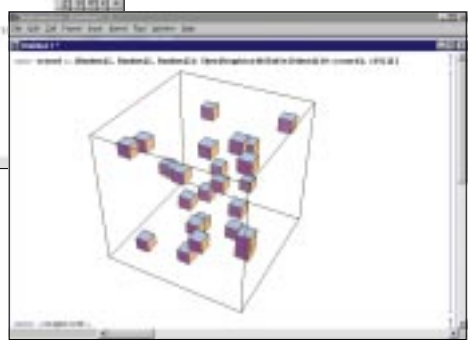
Personal Computer World Recommended

Out with that abacus, incarcerate that calculator. Let Mathematica work out your algebra.

Mathematica was the first commercially successful Computer Algebra System (CAS): a package that combines exact symbolic manipulation, graphical representation and approximate numerical calculation.

At the lowest interactive level a CAS allows you to do arbitrary precision arithmetic, factorise polynomials, solve algebraic and differential equations, do trigonometry and manipulate matrices. With a few commands, A-level mathematics and statistics questions are rendered almost trivial, the student hopefully gaining more than immediate gratification! Beyond its basic use as a black-box symbolic calculator, an up-to-date CAS must be programmable, capable of producing publication-quality output and interacting with other software.

Mathematica 3.0.1 is one of the big three CASs, the others being Maple v5 and Macsyma 2.3. Although CASs were designed and used for research in the mathematical sciences, there are probably now more users in other fields. Mathematica in particular is used in engineering for development and design work. It plays a big role in sophisticated financial and economic modelling and in simulations of complex physical and biological systems. Mathematica and Maple, and the much smaller CAS, Derive, are used extensively as a medium for the teaching of mathematics and its applications.



Left A notebook with various input and output forms
Below Randomly generated cuboids

The advanced notebook environment of Mathematica 3 provides not just the means of invoking the algebraic calculator but also the production of anything from student worksheets to electronic books with hyperlinks. There are enough special characters and fonts to keep most typesetting freaks happy. Input and output of mathematical expressions can be in standard 1-D form, or in the more attractive 2-D form usually found in printed textbooks. This can all be done from the keyboard or by using palettes.

Graphics, expressions and whole notebooks can be converted to alternative formats including PostScript, GIF, HTML and TeX, the lingua franca of scientific publication.

Apart from the addition of over 250 new mathematical functions, Mathematica 3 is now able to solve certain types of partial differential equations. The latter is important for applications but is new and tricky to implement in CASs.

Attention to numerics has always been an important consideration in Mathematica, particularly the tracking of precision during computations. The numerical linear algebra routines are now nippy: the numerical inversion of a 400 x 400 random matrix took 35 seconds on my Pentium 133. The specialised linear algebra package, MatLab, took nine seconds.

For advanced work the Mathlink interface provides a protocol for two-way communication between external programs and the Mathematica kernel. This is not for the faint-hearted. Despite the small increment in version number from 3.0.0 to 3.0.1, the latter is a considerable upgrade in terms of speed increases and bug fixes; in particular, problems I experienced with the printing of graphics have now gone away.

Support for Mathematica is extensive. There are well over 100 Mathematica-based books: the newsgroup comp.softsys.math.mathematica is very active. At 1,403 pages the excellent manual, once on the desktop, stays there. Although webbies soon home in on the MathSource, an archive of Mathematica notebooks covering numerous applications, it seems rather mean that the £30 MathSource CD is not bundled with the software.

Compared with other packages Mathematica has always excelled in the quality of its graphical output and in its list-manipulation tools. Most CASs, Mathematica included, have weaknesses in symbolic integration. A curious one is Mathematica's failure to find the indefinite integral of Abs[x]. Less surprising, because most CASs make a pig's ear of it, the wrong answer is given for the indefinite integral of Sqrt[1-Cos[x]]. As in a game of leapfrog, nothing stands still for long. On balance, a snapshot puts Mathematica just ahead. You get an awful lot for an awful lot of money.

Nigel Backhouse

PCW Details

Price £1,175 (£1,095 ex VAT)

Contact Wolfram Research 01993 883400 www.wolfram.co.uk

System Requirements Win95, NT 3.51 or higher.

Good Points Brilliant notebook interface and graphics quality.

Bad Points Expensive.

Conclusion Mathematica encapsulates 2.5 millennia of mathematical know-how.

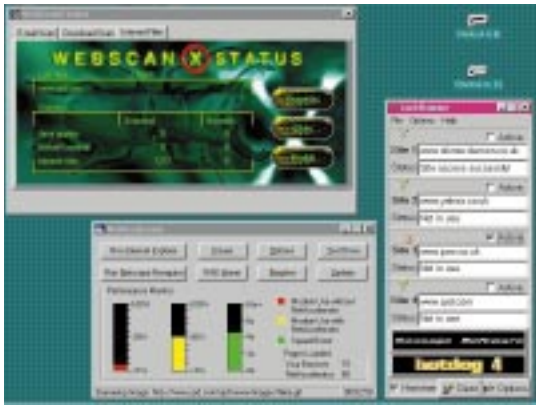
★★★★★

Software

IMSI Net Accelerator Deluxe

Don't stand for sluggish browsing on the net — wind it up on the web with this new package.

Net Accelerator Deluxe promises to speed up your web browsing, while the six accompanying applications will revolutionise the way in which you use the net. The idea is simple: while you read a page on the net, your modem is idle. Net Accelerator uses this time to download the content of the pages linked to your current document, so when you click on a link it is ready and waiting in the cache for instant access.



Net Accelerator is hard at work while you are

Used in conjunction with NetJumper, one of the six utilities, a single click will list the addresses of every link on a page, saving users from shuttling between a main menu and its sub-pages when searching a site. The links are stored in a menu and VCR-like controls let you click forwards or backwards to URLs in the list rather than the next or last URL visited, as is more often the case.

When we experienced difficulty accessing a few of our chosen sites, we turned to JackHammer, an application which automatically and constantly tried on our behalf to enter busy web pages or ftp sites which had exceeded their maximum number of users. While it ran in the background, we continued browsing.

Also in the bundle, WebSleuth Lite is a fast search facility which not only hunts through the common search engines and presents a list of returned hits, but also generates an abstract of each match based on the first few paragraphs of text. Perhaps the most impressive utility of the bundle is Gravity Lite, an easy-to-use newsgroup tool. Selecting one of the many publicly accessible news servers indexed on the net, we were reading regular newsgroups in minutes and following up article threads with ease.

Underlying these applications is an award-winning virus scanner that keeps watch on all downloads, emails, Active X and Java applets. WinPack provided idiot-proof file compression and decompression with speed and ease.

Nik Rawlinson

PCW Details

Price £34.99 (£29.78 ex VAT)
Contact IMSI 0181 581 2000 www.imsiuk.co.uk
System Requirements Win95, 98, NT4.0 and up.
Good Points Extensive applications. Easy to use.
Bad Points Some applications require a higher spec than is advertised on the box.
Conclusion It's what we never knew we couldn't live without.
★★★★☆

Lernout & Hauspie Madison

Listen to your PC talk text with a more natural voice, male or female, in any of six languages.

Although text-to-speech synthesisers have been a godsend to many disabled people, few products have existed for the average PC user — the sounds created are too harsh and robotic to be comfortably understood. Much of the way we understand language is derived from listening to patterns and rhythms of speech as much as from the words themselves.

Madison, from Lernout and Hauspie (L&H), which will be released in the next three months, tries to circumvent these problems. First, it has both female and male voices. Although these are audibly mechanical, different users can choose whichever sounds more natural to them. The words spoken are not stored individually as audio files but are worked out by looking at the syllables in the words and then comparing each one to a rule base and a dictionary of exceptions.

Perhaps the real difference is that Madison varies the speech created according to the way in which the sentence is structured. So, it will pause slightly after commas and for longer at full stops and it will drop its tone before commas and full stops, just like human speakers. It does nothing as sophisticated as breaking down the sentence grammatically, but works out the boundaries of the sentence using its linguistic engine.


Speech can be dragged-and-dropped from most Windows applications

The application supports British and American English, French, German, Dutch, Spanish and Italian. None of these take up much room; three languages took up 1.3Mb. You can use Madison with any Windows applications which contain text. I got it to work directly with Word and ccMail, but not with Netscape (it needs Outlook to work with net applications). You can copy text into the clipboard and either tell the system to read it from there, or set it to read any text as soon as it is put into the clipboard.

Why would you want it? To listen to emails while you are looking at other things and/or as a proof-reading tool. But until we are all using dictation, it may seem a bit of an odd tool.

Adele Dyer

PCW Details

Price £299 (£254.47 ex VAT)
Contact L&H 00353 1209 1799 www.landh.com
System Requirements Windows 95 and NT.
Good Points More natural speech synthesis than before.
Bad Points Voices are still robotic.
Conclusion Of limited use, as yet.
★★★☆☆

p168 ➢

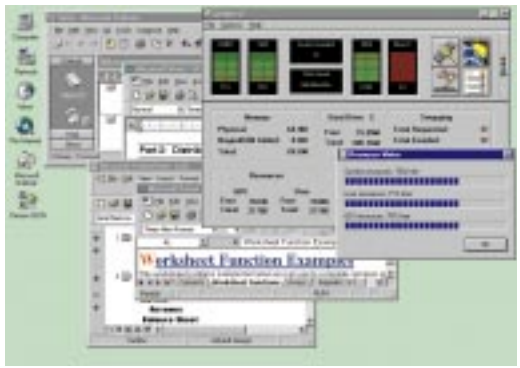
Software

Quarterdeck Qemm 97

Fine for optimising memory, particularly in DOS and Windows 3.1. Not so good for Windows 95.

Qemm 97 promises to save memory and speed up Windows 95. It still works in DOS and Windows 3.1 the way it always did, but now it has a new graphical interface and Turbo Load II which claims to accelerate the loading of Win95 applications. It also includes MagnaRAM memory compression technology which reduces paging to disk for Win3.1 and 95. If you are still struggling with Win3.1 memory or resource shortages or even with DOS games under Win95 there may be some justification in buying Qemm 97, but I can't see the point, with memory now costing from around £1 per megabyte.

Provided you don't fit more than 64Mb to your motherboard, adding memory to Win95 is cheaper and more effective. The reason you wouldn't want to add more than 64Mb is because most motherboards only cache 64Mb RAM. Since Win95 loads applications from the top of memory, more than 64Mb will result in reduced performance.



System resources monitored with Qemm

Prior to installing Qemm 97 on a Win95 system with 64Mb RAM and Office 97, I loaded Outlook, Excel, Word and PowerPoint. This pushed the swapfile to 36Mb and reduced free memory to 300Kb. System, User and GDI resources were around 70 percent. Qemm 97 installs easily with graphical screens and automated reboots while it checks the system to see where it can save DOS memory. Post-install, I re-loaded the Office programs: System, User and GDI resources stayed at 70 percent, the swapfile went up to 55Mb and there was 375Kb free memory at idle. Net benefit? A bigger swapfile, accessed less frequently.

You must start your applications a couple of times to gain the benefit of Turbo Load. If they loaded any faster it was by a few seconds; but surely the point of Win95 is that you don't keep having to re-load applications? Qemm 97 has a pretty interface but as far as Win95 is concerned, spend your money on RAM.

Terence Green

PCW Details

Price £74.99 (£63.82 ex VAT)

Contact Quarterdeck 00800 7212 7212 www.quarterdeck.com

System Requirements DOS, Win3.1, Win95.

Good Points Good for DOS and Windows 3.1 memory problems.

Bad Points Not very useful for Win95 unless you have memory problems with DOS games.

Conclusion Buy RAM instead.

★★★☆☆

KeyView Pro

KeyView claims to view up to 200 formats, including obscure ones. It's the key to email success.

If nothing else, the net is responsible for people throwing files around the planet at each other in mad abandon. But how many times have you sent a file to someone, only for it to return with a hassled addendum along the lines of: "I can't read this file".

There are solutions to this problem, including one that comes bundled with Windows 95, called QuickView. File viewers have existed for a long time, only leapfrogging each other in the number of formats they cover. And KeyView Pro is another in that field, with the distinction of letting you actually do useful things with those files, such as printing and searching.

KeyView Pro claims to view nearly 200 file formats, including some fairly obscure ones such as Applix Asterix and Targon Word. Not all of these are included in the standard install. Strangely, though, the installation gives you no control over which filters to install: it's either a group of them, or all. And is this a slight aimed at Lotus? Ami Pro is part of the standard install, but to get the Word Pro filter you need to do the full installation!

Successful takeover bid: KeyView dethrones QuickView's position on the context-sensitive menu

Installation adds a second menu that leads to a set of compression and printing options. You can compress to Zip, Tar, UUEncode, BinHex and Z. But choose to view a file and the KeyView Pro window appears, letting you view a page, select and copy text, and convert by saving to a few formats restricted to HTML, RTF for documents and spreadsheets, and some image formats.

KeyView Pro integrates well into IE3 and Navigator 3 and later, acting as a plug-in for a number of formats such as multimedia. It adds a few features to the standard viewer programs. If QuickView doesn't do enough, consider KeyView an upgrade.

Paul Smith

PCW Details

Price £39.99 (£34.03 ex VAT)

Contact Cross Atlantic Software 0171 228 6992

System Requirements Win3.1, Win95.

Good Points Context-sensitive menu. Two hundred file formats.

Bad Points You cannot pick and choose formats to install.

Conclusion Improves on QuickView.

★★★★☆

p170 ➢

Software

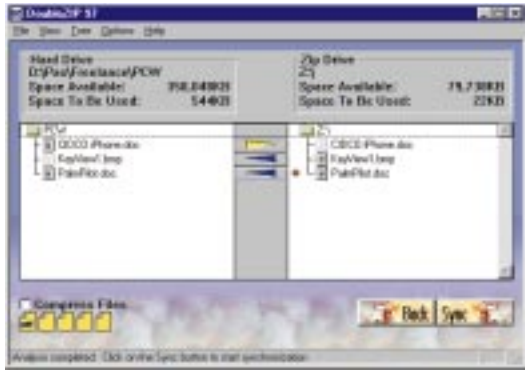
DoubleZip 97 v1.20

Zip-a-dee-doo-dah! DoubleZip is a backup and synchronisation program that does a good job.

There are two types of utility. The first consists of those programs that allow you to do things you cannot already do. The second type doesn't. DoubleZip, a backup and synchronisation program, sits in the second camp which is not necessarily a bad thing. I *could* edit registry settings using RegEdit. I *could* send email using cc:Mail. But there are alternatives that make these processes a lot easier.

Similarly, Windows 95 comes with the ability to compress (DriveSpace), back up (Backup) and synchronise files (the Briefcase). There are also brilliant shareware alternatives to these free programs: PKZip or WinZip are examples. And Iomega Zip users, at which DoubleZip is primarily but not exclusively aimed, get a very easy-to-use backup program.

So, DoubleZip lives or dies on its success in improving on these programs, or in the way you use them, sufficiently to justify its price. And it does so only in some ways: it's an aggregator, so you have control over these features all in one place.



Compression uses the PKZip algorithm so you can share backed-up files with almost anyone

DoubleZip will synchronise files between two directories on two drives and back up files to drives (only if they're removable) — and it will optionally compress them in the process. The distinction between synchronising and backing up is important: synching won't deal with system and hidden files, which is no use if you want to restore a disk. So, you can't back up to a hard drive. DoubleZip has no facility for uncompressing any file individually; you have to uncompress whole directories at once. But even then, DoubleZip doesn't do it — you need to use the separate Compress utility.

DoubleZip's most useful function is synchronising. This is handled in a bizarre fashion by Microsoft's Briefcase, so if you use two machines and share files between them, this might be justification enough to purchase it. Otherwise, stick to other utilities.

Paul Smith

PCW Details

Price £39.99 (£34.03 ex VAT)
Contact Cross Atlantic Software 0171 228 6992
System Requirements Win3.1, Win95.
Good Points Synchronising function.
Bad Points No facility for uncompressing any file individually.
Conclusion Stick to other utilities.
★★☆☆☆

Debabelizer Pro 4.5

A hot tool for web designers, with palette optimisation and batch processing. Go on, debabel it!

Debabelizer is a hot tool among web designers, due to its palette optimisation and batch-processing facilities. This latest version extends those capabilities and adds several new features.

Version 4.5 lets you create composite images by placing one on top of another. You can compare images to identify different pixels and replace them with pixels of a specified colour, so you can replace the red background in all the frames of a banner ad with another colour, or copy the pixels to an alpha channel to create a mask. The Batch Automation Composite and Compare operations allow you to walk through the process for one file and generate a script which can be edited and applied to remaining frames of an animation or other batchlist.

Batch processing has been muscled up. You can now run scripts within scripts by inserting a series of execute script operations into a master script. Improved error handling reduces the chance of it hanging up five minutes after you've walked out the door. You can disable the display during automated processing to give a performance boost. Batchlists are now more flexible: you can sort and reorder them by any criteria you like, and drag files into the batchlist at any position you want.

The pixel shift feature does the same thing as an offset filter: shifting the entire image by a given number of pixels in any direction with either a wraparound or background colour replace option — good for scrolling animations. The pixel locator, which flashes image pixels of a selected colour, provides a useful way of assessing the impact of colour palette modifications. Animators will appreciate the improved multi-framed image handling and processing. You can now bring in AVI files as if they were any other multi-framed image and reverse the process, saving multi-framed files as .AVI files. An improved interface with greater use of drag-and-drop, and support for new file formats including PNG, EPSF and Kodak Flash Pix, complete the picture.

Setting up automated processing couldn't be easier. The script in the top window is applied to all the images in the batch list in the lower window

Ken McMahon

PCW Details

Price £468.83 (£399 ex VAT)
Contact Computers Unlimited 0181 200 8282
www.equilibrium.com
System Requirements Windows 95 and NT,
Good Points Good colour optimisation. Automation features are now even better.
Bad Points It costs too much.
Conclusion If you do this stuff, you gotta have it!
★★★★☆

Grolier Encyclopedia 1998

Why has Grolier put so little thought into content and linked sites? Could do better, definitely.

Left Pretty pictures — but not more than one per page

Middle You get the odd extract from great works, but the articles are patchy

Below Colourful timelines that do not necessarily follow a theme

Not so long ago there were only two multimedia encyclopaedias of any importance: MS Encarta and the Grolier Encyclopedia. Since then, many more have appeared, but Microsoft has invested heavily in Encarta, drawing on its own rights to various sources of information and media and setting up localisation teams who not only adapt the US content to their own specifications but also carry out their own research and commission their own articles. Meanwhile, Grolier seems to have rested on its laurels, making a half-hearted attempt to catch up but not investing the requisite cash.

You only have to look at the cover of the box to see that the Grolier 1998 Multimedia Encyclopedia is US-centric. It features the Statue of Liberty, Neil Armstrong and a little composite picture representing the American Civil War. Load the CD, start a search and it becomes obvious that US spelling has been used throughout. Search for "colour blindness" and you will be met with a blank stare, but knock out the "u" and you will get to what you are looking for: as Grolier seems to be pitching its product at schools and school-age children, this might prove to be its undoing in Britain.

The interface is neatly broken down into sections: articles, gallery, timelines, atlas, guided tours and interactivities. Starting with articles, you cannot help but compare them to Encarta and they do not come out well. Although most are attributed to experts in particular fields and are followed by a bibliography, these authorities seem either to have been given a limited brief or not to have had the necessary guidance to create good entries. Some tend to wander off the point, while others assume too much reader knowledge. In Encarta the entries are more complete but they are also better ordered, broken down into sections with the longer entries having a little index down the left-hand side. Grolier's articles meander and require you to scroll down before you find what you are looking for — provided it is there in the first place.

If you compare the articles on France, in Encarta and Grolier, in the former you will find better maps, more sounds, a fact box containing the most important facts pulled out so they are easy to find, an index to the article and just about everything you could possibly need to know covered in the detailed article itself. Skip over to the Grolier and you get a tiny map and a tinny rendition of the Marseillaise anthem on an old "joanna" and trumpet, followed by a lolloping great article on France with no index and far less detail than you find in Encarta. There is a fact box, but compared to Encarta's it is badly laid out and badly thought out. The piece on France's history, in the general section about the country, is woefully inadequate and although it has a more comprehensive article of its own, there is no obvious link to this. There are numerous pictures but these are on a separate links list and do not change as you scroll down the page, as in Encarta.

The other sections seem to have suffered from the same lack of thought. The timelines are grouped according to definite sections, such as Reason, Rights and Revolution for the 18th Century, and The Machine Age to cover the industrial revolution, but once you are into these, apart from a short multimedia presentation covering the subject in quite a vague, all-encompassing manner, there is not enough in the timeline to warrant the subject heading. In the one on the 18th century, for example, we could not find any mention of the Enlightenment, which the title "Reason" seems to suggest should be present.

As in Encarta, the encyclopedia comes on two CDs and there is a study guide of sorts. But unlike Encarta's version it is not a means of collecting and ordering the information you have found, but is rather like a quiz book for 11-year-olds and not much use to older students. There are web links to more information but, unlike Encarta, there is no rolling list of linked sites.

Grolier has let itself down with this encyclopaedia. The articles are badly commissioned, the content is patchy, the whole thing is poorly organised and the links are atrocious. You should do yourself a favour and either get Encarta or, for younger users, go for the Europress Family Encyclopedia we reviewed in last month's issue.

Adele Dyer

PCW Details

Price £39.99 (single disc), £49.99 (double disc)
Contact 01865 264800 www.grolier.com
System Requirements Windows 3.x or 95
★★☆☆☆

James Bond Dossier

Personal Computer World Recommended

"You are a clever and resourceful man, Mr Bond…" but this CD will prove to be your equal.

Now pay attention, double-oh-seven, this is important. "The Ultimate Dossier: James Bond 007" is a new CD from Eidos and it contains everything you could possibly want to know about your missions, up to and including GoldenEye.

Over 70 minutes of video and more than 240 WAV files will let you relive some of your greatest stunts while the hyperlinked text should contain plenty of facts that even you don't know. Villains, girls, gadgets and cars are pictured and indexed by mission, type and alphabetical order.

There's no excuse for forgetting a face, either, with the biographies of 186 cast and crew members. Clicking on a link from the opening menu will connect you with an associated web site. With 1,800 images to browse and more than 800 articles (totalling 300,000 words) to be read, though, I hardly think you'll have time for that.

A spectacular full-screen video montage introduces the dossier but you'll soon realise that this is merely a hint at the lavish graphical interface to come. Continuous original background music, all of it drawn from your 17 adventures, and countless facts and figures come together to make up this first class multimedia experience. Each mission is chronicled in finite detail and launches with a skilfully-crafted AVI movie outlining some of the key features of the plot. I hope that looking through the Q branch files at the countless gadgets and vehicles you have managed to destroy on your many missions will teach you to be more careful in future.

Exclusive behind-the-scenes photos will let you in on the secret world of those who record the adventures of a double-oh agent. When you think you're up on everything in this extensive resource, try Her Majesty's Secret Service Trivia Challenge and increase your security clearance by answering questions correctly.

Don't worry about using this in the field, Bond. It has been designed to work on a 486/66 with merely a double-speed CD-ROM, 8-bit sound and 15Mb hard-drive space.

Nik "Q" Rawlinson

PCW Details

Price £29.99
Contact Eidos 0181 636 3000
www.mgmua.com/bond/interactive.html
★★★★★

Animated Email Magic

Personal Computer World Recommended

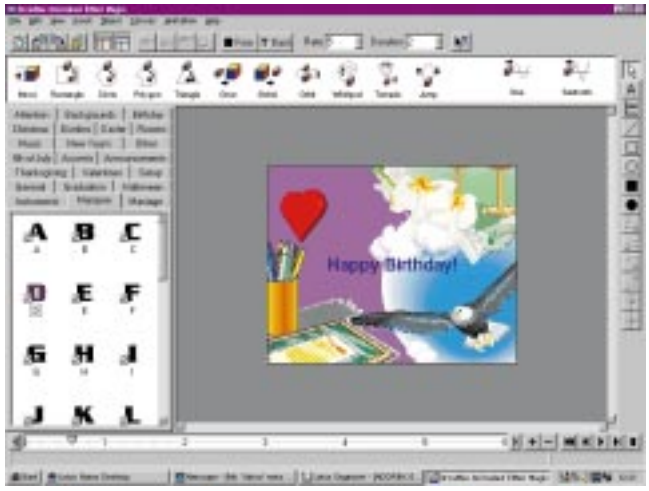
Tart up those emails with images, sound and animation. It may be kitsch but it's great fun.

Released last year in the US, Animated Email Magic proved something of a hit in the land of the free local phone call. Win95 users can combine all manner of animated characters, backdrops, tunes and logos and send them as email attachments in the form of a self-extracting executable which can be viewed by Windows 3.1 and 95 users, regardless of whether or not they have Email Magic installed.

The first thing you notice about this application is how simple it is. First off, you can use the supplied library of images and sound: just click on the images you want and drag-and-drop them onto your electronic canvas. You can pick the movement you want your image to describe or define your own, arrange as required, sprinkle in some relevant text and you are ready to start pestering all your online chums, worldwide.

Sending your moving art is as simple as constructing it: emails may be sent from your own mail server or via a third-party MAPI-compliant email server. Email Magic claims to be able to run on any email software; you just type in the relevant addresses and domain names.

If you were able only to use the images and sounds supplied with the software you might soon grow bored, but as you can import them from your PC, the possibilities are endless. You can grab artwork and sounds from the internet, for instance, and include them on your email. And this adaptability is just as well, because some of the images and tunes supplied are the worst kind of Uncle Sam kitsch. Apart from the birthday- and wedding-type image folders there are others full of exclusively American celebrations such as Fourth of July and Thanksgiving, with images like the Stars and Stripes and the Liberty Bell. This doesn't stop this software being great fun, though, because you can still enjoy sending cheesy, kitsch email to those who love anything naff. Or, you could import your own artwork and use both your imagination and the user-friendly tools provided to produce something pretty impressive.



Paul Trueman

PCW Details

Price £24.99
Contact Jellyfish Software 0161 477 4235
System Requirements Windows 95
★★★★☆

Software

The Day The World Broke

Saving the earth, with a difference. In this, the environment goes pear-shaped, but so might you.

Do you know how the world works? Apparently it's all done with mirrors, or so The Day the World Broke would have you believe. The story is that the two crotchety engineers deep below the earth's surface, at World Works HQ, have lost control of the global "tune-up" they were conducting and now there are all manner of volcanoes, earthquakes, floods in the desert and flying cows unleashed on the surface.

You must journey much deeper into the earth's core and somehow fix whatever environmental control has gone AWOL. Along the way there are a number of tasks to perform that will have you trying to make and mould ingots, sculpt glass and of course save the world.

The Day the World Broke is an artfully surreal take on the earth's geology and environment, with its bizarre mix of point-and-click science, storytelling and plain mumbo-jumbo. Artist David Wiesner has drawn all of the lavishly-illustrated backdrops to the game, against which the mixture of 3D-rendered and motion-captured characters interact with your own character.

This is a game aimed principally at those aged nine and upwards, although half an hour into it the truth tragically dawned on me that had I tried this game at the age of nine, I would have been completely stumped.

Not wishing to cast aspersions on the mental abilities of today's pre-pubescent population, but The Day the World Broke seems a touch tricky for anyone lacking Mensa credentials. There is no set plot and the story develops differently depending on which locations and characters you visit. This is all fine, but the game's lack of direction may bore some younger minds. Or maybe I'm just grouchy because I was flummoxed after half an hour. This kind of mental adventure playground is the perfect present for anyone who finishes jigsaw puzzles and crosswords too quickly.

Paul Trueman

PCW Details

Price £29.99
Contact FastTrak 01923 495496
www.fasttrak.co.uk
System Requirements Windows 3.1/95
★★★★☆

Kids' Art

A pirate with a taste for masterpieces, a cultural journey… It will help your kids appreciate art.

If your child fancies itself as a bit of an artist, Kids' Art is definitely the CD which will teach them all they need to know about the world of art. It is recommended for children aged between seven and twelve years old and can be used at home or at school.

It is an informative adventure game and provides a cultural understanding of art, teaches a child how to recognise characters, such as a saint, in a painting, and provides a background to painters such as da Vinci and Van Gogh.

The game is based on a journey. On this journey you meet different characters who are looking for works of art and who want to talk about them. The first character is a pirate who is after some famous paintings for his ship. You have to distinguish famous paintings from a child's doodles. As you are doing this you can get information about the work of art, such as when it was produced and the artist's name. Other activities include matching the correct background with the correct painting and how to paint a subject in proportion.

It's not all paintings, though. Sculptures, too, appear in this CD. You can learn about famous statues and even have a go at restoring some, in a game where you have to match the head to the statue.

There is even a section dedicated to architecture. Find out the history behind the Arc de Triomphe — its significance and how it was built. And why did Pope Clement XII want the famous Trevi fountain to be built in Rome? All your questions will be answered.

The only annoying feature in this CD is the narrator. He talks exactly like Homer Simpson, in a very slow and brainless fashion, is very repetitive and eventually does your head in. The thing is, he pops up quite often, as there is no written help with this CD. The help is context sensitive, which means that each time there is a problem, the narrator will explain what to do.

Etelka Clark

PCW Details

Price £24.99
Contact Emme Interactive 0171 431 9017
www.emme.com
System Requirements Windows 3.1/95
★★★☆☆

Software

5 YEAR TEST

CorelDraw 3

This graphics package may be an OAP, but it can still hold its own against the whippersnappers.

Version 3 of CorelDraw consists of three applications: Draw, a vector-drawing program; Photopaint, for bitmap image editing; and, perhaps a little out of place, Chart, a graphing/presentation program. Also included are modules for converting bitmap images into vector formats, a screen-capture utility, an image-gallery viewer, and tons of clipart and fonts.

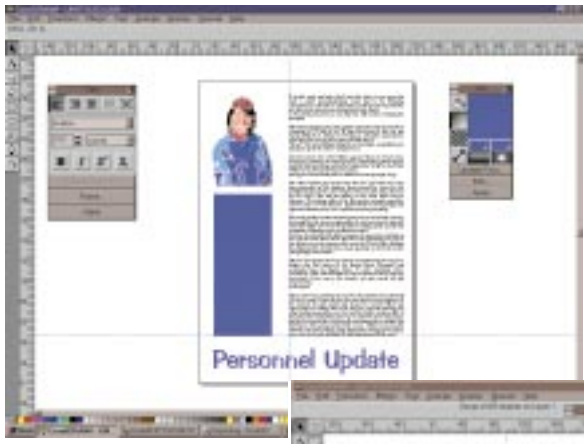
Many of these facilities are now available in cheaper programs, but back then, CorelDraw had little competition. Even today, it's unusual to find all these functions together. Sadly, that's not to say the applications are particularly well integrated; they simply came in the same box.

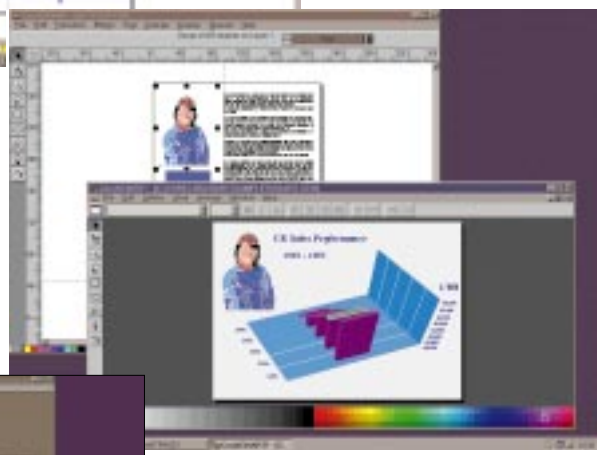
The main program, Draw, works with objects (text, graphics or bitmap images) providing a multitude of effects which can be applied to objects individually or as groups. Most functions are reached by a combination of basic tool buttons locked to the left of the display and floating drop-down boxes which can be hidden.

On the page, an object can be resized, stretched or skewed to give the impression of depth, or extruded to give a solid appearance. Text can be aligned to other objects. The placement of objects can be as precise or as flexible as you like; they can be moved around freely or set to snap to guides or a grid. Application of colour to objects is versatile, with the fill and outline properties of objects being infinitely variable. Colours can be defined by an industry-standard coding system or picked from CYMK, HSB or RGB palettes to suit the final use of the artwork.

By today's standards Photopaint, the bitmap editor, is limited if you want to create photorealistic masterpieces. However, it provides all you need to retouch an image before importing it into, say, Draw. Adjustments to brightness and contrast are made from the floating toolboxes, although defining the degree of effect applied is achieved through a rather unintuitive palette box.

Chart seems to be an odd companion to the graphics programs but is a capable presentation generator seemingly aimed at business professionals. Although office suites offer similar applications today, when CorelDraw 3 was released the only competition came from top-of-the-range dedicated programs. Yet again there's a slightly different interface with which to contend, but Chart still holds its own against today's products, letting the usual bar and pie charts be constructed with many variations of 3D effect.





Bitmaps from the other programs in the suite import easily and can be resized or moved as required. Importing vector images is less successful. Surprisingly, the native CorelDraw format (.CDR) is not even an available option. It is easier to export vector images from Draw as bitmaps before importing them to Chart, but you will lose many of the benefits offered by vector formats.

"Trace" converts bitmap images into vector format and, although offering limited options to vary the accuracy of the scan, it can produce quite artistic effects. The program saves files in .EPS format only, strangely not taking advantage of the native file format of the main program.

The differences in the user interface and the lack of support for the .CDR file format are a legacy of Corel buying-in large parts of the various packages.

CorelDraw has a steep learning curve but it does come with an excellent multimedia tour which gives you enough familiarity with the principles to play with the various applications. CorelDraw enables me to produce simple designs, forms or newsletters and drop-in logos, pictures or stylised scans, and it's enough to avoid that "done-on-a-word processor" look.

CorelDraw 8 has recently been released and version 3 is now being distributed on magazines' cover-mounted CDs. If you are a computer artist you'll want to get your hands on the latest version without delay. The rest of us have the opportunity to use what remains a sophisticated graphics suite for next to nothing.

Gary Beaton

PCW Details

Price Then about £250. Now available bundled free with magazines, or £30 retail.

Contact Corel 0800 581028 www.corel.com

Good Points Versatile. Lots of facilities.

Bad Points Inconsistent user interface.

Conclusion Although the enhancements of current versions are missing, it has all the basic functionality most people need.

★★★☆☆

We welcome readers' contributions to our *Long Term Tests* section and pay for those we publish. If you've used a piece of hardware or software for some time, write a 300-word piece for hardware or 650 words for software (plus GIF-format screenshot for the latter) and send it on disk in MS Word or ASCII format to Lynley Oram at the usual *PCW* address, marking your envelope "Long Term Test". Or email it to lynley_ oram@vnu.co.uk

p176 ➢

Hardware

3 YEAR TEST

Canon BJ-200

Prints charming? Yes, this printer comes from good stock and produces the goods every time.

Three years ago I bought a BJ-200 from my local computer superstore at an excellent price. An indication of how the market has moved in the years since is that you can buy Canon's present equivalent for about £130 less than I paid.

Getting started with the BJ-200 took all of ten minutes, and involved setting the DIP switches to the correct emulation mode and popping the supplied BC-02 cartridge into the printer.

The BJ-200 has an elegant design with a small footprint that would not look out of place on your desk today. Print quality is superb and offers three modes: High Speed, High Quality and Super High Quality. The difference between the three modes is the amount of ink deposited on the paper. I have found that for most letters the High Speed mode is more than adequate and has the added advantage of making your ink cartridge last a lot longer. High Speed also allows you to use cheap photocopier paper with no discernible ink smudging or blotting, and of course it saves you time as documents get printed much faster than on the High Quality modes. One criticism would have to be the cost of the BC-02 cartridge, which is more expensive than other inkjet cartridges.

The printer copes well with graphics but for best results you really need to use the High Quality or Super High Quality modes with expensive coated paper. Its small size makes it reasonably portable and the built-in 80-sheet feeder makes printing multi-page documents easy, whether you're at home or on the move. The BJ-200 also comes with a printhead self-cleaning facility which I have never had reason to use, except out of curiosity.

Although an impulse buy, I have never had cause to regret buying the BJ-200 which I have found to be very reliable with excellent print quality. It is an ideal printer for home use and could probably hold its own against many of the latest inkjet printers on sale today.

Nasar A Nawab

PCW Details

Price Closest equivalent BJ-250 around £123 (£105 ex VAT)

Contact Canon (UK) 0181 773 6000

www.europe.canon.com/

Good Points Small footprint. Print quality. Styling.

Bad Points Expensive ink cartridge.

Conclusion Ideal secondhand buy for home use.

★★★★☆

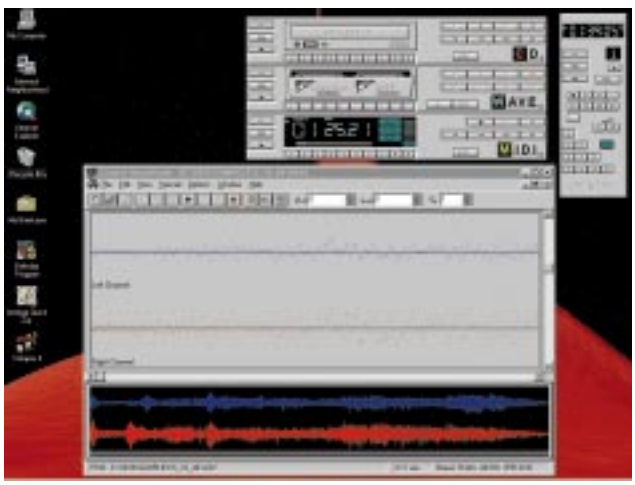
SoundBlaster AWE 32

3 YEAR TEST

Great sound. Expandable memory with 2 x 16Mb SIMMs but you gain 28Mb and lose four. Eh?…

I bought the Creative Labs SoundBlaster AWE 32 when it first came out just over three years ago. It is based on the popular SoundBlaster 16 but has many extra features like the 128-instrument, six drum-kit, programmable effects synthesiser.

If you have ever tried using a SoundBlaster 16 setup in a game and then changed to an AWE 32 setup, you'll know how much difference there is between the sound quality of the two cards.



When I took it out of the box I was surprised by the size of the card, which is a "full-size" 16-bit card measuring 33cm. This may be a problem in some machines, especially when you're trying to stretch the cables to the CD-ROM drive. Luckily, by moving some of the other cards I could just fit it in. Unlike today's sound cards, with IDE interfaces, it has three CD-ROM interfaces: Sony CDU-31A/CDU-33A, Mitsumi LU005/FX001 and Creative CR-523 / 563.

The AWE 32 has a 4Mb on-board memory, which can be expanded to 28Mb via its two 32-pin SIMM sockets. The weird thing is, to do this you have to use two 16Mb SIMMs, which means somewhere you lose 4Mb. The AWE-32 also comes with eight floppies loaded with software for DOS and Windows. I have since changed operating systems, which has left this software badly out of date.

Only a month or two after its release some games had already hit the market which supported the AWE 32. One of the things that most impressed me about the card was the way it played the file of music known for the moon landings (Strauss' "Also Sprach Zarathustra"): the kettle drums seem so realistic. With some new software drivers, it should last me some time yet.

Glenn Turner

PCW Details

Price Was £238.53 (£220 ex VAT).

Contact Creative Labs 01189 344322

www.cle.creaf.com

Good Points Great sound quality and performance.

Bad Points Strange 4Mb memory loss. Size.

Conclusion Not a bad buy, but now needs a software update.

★★★☆☆

p179 ➢

Hardware

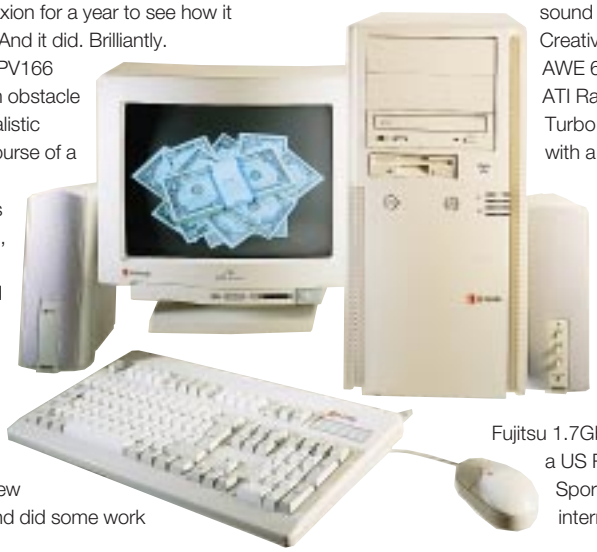
1 YEAR TEST

Hi-Grade Axion PV166

There's no tougher test — this PC got put through the mill of the *PCW* office. It performed well.

Last year, *PCW* had the Axion PV166 in for a PC group test. It's hard to believe, but at that time a P166 MMX-based PC was at the cutting edge. Back then, the Hi-Grade won our Editor's Choice award. As they say, the proof of the pudding is in the eating, so we asked if we could test the Axion for a year to see how it would hold up. And it did. Brilliantly.

We put the PV166 through a tough obstacle course of journalistic abuse. In the course of a year we cycled tens of graphics cards through it, added and subtracted hard drives, partitioned and reformatted the original hard drive often, tested software on it, played a few games… oh, and did some work on it, too. It held up beautifully and only threw up one or two hardware conflicts which were easily solved after a little investigation.



So what was in this magic box? A simple configuration, especially by today's mammoth specifications. Hi-Grade included the newest sound card from Creative Labs, the AWE 64, as well as the ATI Rage 3D Pro Turbo graphics card with a hefty 4Mb of SGRAM. Added to this was a Toshiba XM 5702B 12-speed CD-ROM drive (*passé* by today's standards), a Fujitsu 1.7Gb hard drive and a US Robotics Sportster 28.8 internal modem. Also present was 512Kb of pipeline burst cache and four SIMM slots (two occupied), allowing a memory upgrade to 256Mb of RAM.

The software was a bit pedestrian — MS Works 4.0, a multimedia games pack and an ATI 3D games bundle). But on the performance side the Hi-Grade never let us down and we were sad to see it leave. The only slight weakness was the 15in ADI Microscan 4V monitor, with its fuzzy image.

Dylan Armbrust

PCW Details

Price £1,697.88 (£1,445 ex VAT)

Contact Hi-Grade 0181 532 6111

www.higrade.com

Good Points Great internal components. Consistently good performance.

Bad Points Monitor was a bit fuzzy.

Conclusion It took a beating but kept on ticking. No complaints.

★★★★★

Software

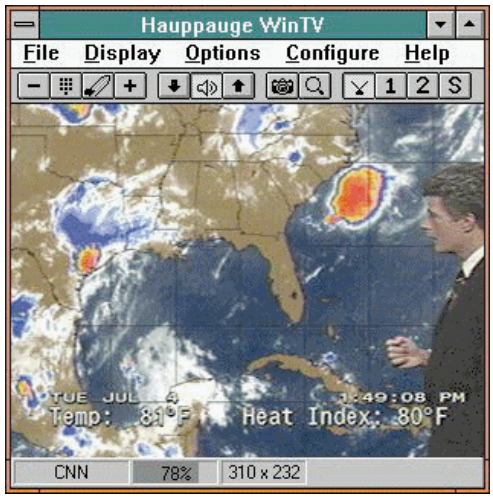
6 MONTH TEST

Hauppauge WinTV-Radio

"I'm working on the PC, darling…" (*…not — I'm watching TV and listening to the radio! Tee-hee!).*

There are those who think we spend too much time in front of our PC monitors, my partner included, so she was not pleased when I bought the Hauppauge WinTV-Radio card because now I don't have to tear myself away from the PC to watch TV!

The WinTV-Radio card takes a single PCI slot. Once in place, it is recognised by Windows 95. Pictures are passed from the card, via the PCI bus, to the graphics card which must be DirectDraw compatible. Audio is passed through a jack lead (supplied) to the sound card. The software provided allows TV to be watched on the desktop, either in a resizable window or full-screen at up to 800 x 600 resolution. The radio can be played (FM only) or you can view teletext data.



Most of the software I needed was supplied on CD-ROM, except for the teletext software. Disappointingly, software had to be downloaded from Hauppauge's web site. This is a black mark against the company, especially as not everyone has an internet connection and there was no information available about acquiring the software by other means.

The card performs excellently provided it is supplied with a good, strong signal. Tuning is straightforward, and once a station is captured it can be given a text label for easy identification. Capable of accepting up to 122 channels, the card outputs stereo sound for the TV as well as the radio, and a strobe feature allows up to 16 channels to be viewed at once.

If you work from home you'll need to be sure of your self-control. Certainly, it hasn't helped my productivity. But then, I have found that it's a great way to keep an eye on the football at the same time as finishing a lengthy report.

Stacey Helton

PCW Details

Price £104.58 (£89 ex VAT)

Contact Hauppauge 0171 378 7309

www.hauppauge.com/index.htm

Good Points Stereo sound. Resizable TV window. Easy to install.

Bad Points Needs a strong signal. Teletext software required an internet download. DirectDraw graphics card required.

Conclusion Great for keeping an eye on your favourite TV programmes while working.

★★★☆☆

Reliability survey

Service and Reliability Survey 1998

PCW is conducting a study of how well your PCs and printers function in the real world. We know what the manufacturers say. We know what our lab tests reveal. But how do the various models perform in the trenches? And how satisfied are you with the hardware, and the shops and manufacturers which sold them to you? How does the after-sales service live up to your expectations?

PCW has joined forces with Maritz Research, leader in the field of Customer Satisfaction testing, in an effort to compile and deliver the ultimate performance guide to computer equipment. Please fill in the questionnaire which follows. Share your experience with us, in confidence, and we will produce a comprehensive report on computer reliability and customer service. The results will appear in our November 1998 issue, so look out for them. Fill in the questionnaire and return it to the address on page 183, by Friday 15th May, and the first 1,000 respondents will receive a free CD-ROM containing the 24 most recent issues of *PCW* (CD features April 96 - March 98 inclusive).

How to fill in your questionnaire

There are a number of questions which ask you to indicate your satisfaction using a five-point rating scale, where 5 is very satisfied and 1 is very dissatisfied. Please feel free to use any number between 1 and 5.

To return your completed questionnaire, cut out the pages or photocopy them, and use the freepost address given at the end of the questionnaire or contact the VNU web site for online completion (www.vnunet.com).

Many thanks for your participation.

Maritz Research is an independent agency conducting research on behalf of VNU into finding out how reliable you think your PC products are. Your opinion would be appreciated in order to highlight the strongest and weakest areas of reliability. Maritz Research is bound by the Market Research Code of Conduct, guaranteeing respondent confidentiality.

ABOUT YOUR DESKTOP OR LAPTOP

PC 1

What make is your PC? (See panel below)
1 Desktop 2 Laptop
3 Other

Model and processor spec. .....
Year purchased .....
Place of purchase
1 Mail order/direct from vendor
2 Superstore/high street retailer
3 Dealer/value added reseller
9 DK

Is this PC located at...?
1 Home
2 Work
3 Both
9 Other

What is it mainly used for?
1 Business & personal use
2 Personal use only
3 Business use only
4 Home-based business

PC 2

What make is your PC? (See panel below)
1 Desktop 2 Laptop
3 Other

.....
.....
1 Mail order/direct from vendor
2 Superstore/high street retailer
3 Dealer/value added reseller
9 DK

1 Home
2 Work
3 Both
9 Other

1 Business & personal use
2 Personal use only
3 Business use only
4 Home-based business

Satisfaction — delivery and installation

How satisfied are you with the...?

	PC 1 Very dissatisfied				PC 1 Very satisfied	PC 2 Very dissatisfied				PC 2 Very satisfied
Availability of the product for delivery when desired	1	2	3	4	5	1	2	3	4	5
Delivery date was met	1	2	3	4	5	1	2	3	4	5
Condition when received	1	2	3	4	5	1	2	3	4	5

PCs 1 Compaq; 2 IBM; 3 Packard Bell; 4 Dell; 5 Gateway; 6 Hewlett-Packard (HP); 7 Toshiba; 8 Dan Technology; 9 Mesh; 10 Fujitsu; 11 Elonex; 12 Apricot Mitsubishi; 13 Digital; 14 OT Technology; 15 Viglen; 16 Evesham; 17 Atlantic Systems; 18 Northwood; 19 Simply; 20 Quantex.
Printers 1 HP; 2 Canon; 3 Lexmark; 4 Epson; 5 NEC; 6 QMS; 7 Oki; 8 Brother; 9 Fujitsu; 10 Panasonic.

PC1

Delivery completeness	1	2	3	4	5
Ease of installation	1	2	3	4	5
Compatibility with other hardware	1	2	3	4	5

Satisfaction — usage

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Quality of the machine	1	2	3	4	5
Standard of features	1	2	3	4	5
Standard of software	1	2	3	4	5
Ease of use	1	2	3	4	5
Performance/speed	1	2	3	4	5
Ability to upgrade	1	2	3	4	5
Price/performance value	1	2	3	4	5
Manuals	1	2	3	4	5
Warranty	1	2	3	4	5

Reliability

How many problems have you had with your PC in the last 6 months which limited your use of it? (If more than 10 please write amount)

1 None
2 1-5
3 6-10
4 10+
5 .....

Using the following comments please classify the type of problems you experienced (circle all that apply)

1 Dead on arrival
2 Failure due to hard drive component
3 Failure due to sound card component
4 Failure due to video card component
5 No display at all
6 Failure due to virus
7 Failure due to RAM
8 Problems with insufficient memory
9 PC would not boot up
10 PC freezes or hangs for a long time
11 Problems caused by the software
Please give details of problems below:
.....
.....

How were the main problems rectified? (circle all that apply)

Provided by place of purchase
1 Telephone/helpline support
2 Electronic (email/web) support
3 Fax support
4 PC repaired on-site
5 PC returned and repaired
6 PC replaced
Other: .....
Provided by manufacturer
7 Telephone/helpline support
8 Electronic (email/web) support
9 Fax support
10 PC repaired on-site
11 PC returned and repaired
12 PC replaced
Other: .....

Repair service

If you had a repair performed on your PC, how satisfied are you with the...?

	Very dissatisfied				Very satisfied
Repair service	1	2	3	4	5
Time taken for the repairs	1	2	3	4	5
Quality of the repairs	1	2	3	4	5
Cost of repairs	1	2	3	4	5

General aspects

How satisfied are you with the overall reliability of your PC?

Very dissatisfied				Very satisfied
1	2	3	4	5

What is the likelihood of you repurchasing the same brand in the future?

Definitely not				Yes definitely
1	2	3	4	5

What is the likelihood of you recommending this brand to your colleagues/friends?

Definitely not				Yes definitely
1	2	3	4	5

If you rated 1 or 2 to any of the last 3 questions, what are your main reasons for low satisfaction, not repurchasing and/or not recommending?
.....

PC2

	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

	Very dissatisfied				Very satisfied
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

1 None
2 1-5
3 6-10
4 10+
5 .....

1 Dead on arrival
2 Failure due to hard drive component
3 Failure due to sound card component
4 Failure due to video card component
5 No display at all
6 Failure due to virus
7 Failure due to RAM
8 Problems with insufficient memory
9 PC would not boot up
10 PC freezes or hangs for a long time
11 Problems caused by the software
Please give details of problems below:
.....
.....

Provided by place of purchase
1 Telephone/helpline support
2 Electronic (email/web) support
3 Fax support
4 PC repaired on-site
5 PC returned and repaired
6 PC replaced
Other: .....
Provided by manufacturer
7 Telephone/helpline support
8 Electronic (email/web) support
9 Fax support
10 PC repaired on-site
11 PC returned and repaired
12 PC replaced
Other: .....

	Very dissatisfied				Very satisfied
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

Very dissatisfied				Very satisfied
1	2	3	4	5

Definitely not				Yes definitely
1	2	3	4	5

Definitely not				Yes definitely
1	2	3	4	5

If you rated 1 or 2 to any of the last 3 questions, what are your main reasons for low satisfaction, not repurchasing and/or not recommending?
.....

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ABOUT YOUR PRINTER

Brand
1 HP 4 Apple
2 Canon 5 Lexmark
3 Epson 6 Panasonic
Other: .....

Model specification .....
Year purchased .....
Type of technology
1 Laser/LED
2 Inkjet
3 Dot matrix
4 Dye sublimation
5 Thermal
6 Other: .....
9 Don't know

Colour or mono
1 Colour
2 Mono
3 Colour capable
9 Don't know

Satisfaction — delivery and installation

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Availability of the printer	1	2	3	4	5
Delivery date was met	1	2	3	4	5
Condition of printer	1	2	3	4	5
Ease of installation	1	2	3	4	5
Compatibility with hardware	1	2	3	4	5

Satisfaction — usage

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Quality of the machine	1	2	3	4	5
Standard of features	1	2	3	4	5
Standard of software	1	2	3	4	5
Ease of use	1	2	3	4	5
Performance/speed	1	2	3	4	5
Print quality	1	2	3	4	5
Paper-handling capabilities (e.g. paper types, paper jams)	1	2	3	4	5
Price/performance value	1	2	3	4	5
Ability to upgrade	1	2	3	4	5
Manuals	1	2	3	4	5
Warranty	1	2	3	4	5

Reliability

How many problems have you had with your printer in the last 6 months
1 None 3 6-10
2 1-5 4 10+
5 ..... (if more than 10 please write amount)

Using the comments below please classify the type of problems you experienced (circle all that apply)
1 Dead on arrival
2 Failure due to printer driver
3 Failure due to memory problems
4 Would not print
5 Unavailability of support/helpline
6 Ribbons/cartridges fitted incorrectly
7 Continual jamming of paper
8 Significant variation in shades produced when printing in colour
Please give details of the problems in the space provided.
.....
.....
How were the main problems rectified? (circle all that apply)
Provided by place of purchase
1 Telephone/helpline support
2 Electronic (email/web) support
3 Fax support
4 Printer replaced
5 Telephone/helpline support
6 Electronic (email/web) support
7 Fax support
8 Printer repaired on-site
9 Printer returned and repaired
10 Printer replaced
Other: .....
If you had a repair performed on your printer, how satisfied are you with the...?

	Very dissatisfied				Very satisfied
Overall repair service	1	2	3	4	5
Time taken for the repairs	1	2	3	4	5

Quality of the repairs	1	2	3	4	5
Cost of repairs	1	2	3	4	5

Cost

How satisfied are you with the running costs of your printer?

	Very dissatisfied				Very satisfied
Overall cost of ownership	1	2	3	4	5
Cartridges/toner/ribbons	1	2	3	4	5
Paper and other medias	1	2	3	4	5
Powersave features	1	2	3	4	5

What are your average monthly consumable costs?

1 Less than £20
2 £20-£40
3 £40-£60
4 £60-£80
5 £100+
9 Don't know

General aspects

How satisfied are you with the overall reliability of your printer?

Very dissatisfied				Very satisfied
1	2	3	4	5

What is the likelihood of you repurchasing the same brand in the future?

Definitely not				Yes definitely
1	2	3	4	5

What is the likelihood of you recommending this brand to your colleagues/friends?

1	2	3	4	5

If you rated 1 or 2 to any of these questions, what are your main reasons for low satisfaction, not repurchasing and/or not recommending?

INTERNET SERVICE PROVIDER

Name of provider .....

What is it mainly used for?

1 Web access
2 Email
3 Both
4 Other

Satisfaction — delivery and installation

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Ability to connect when desired	1	2	3	4	5
Speed to access provider	1	2	3	4	5
Ease of setup	1	2	3	4	5
Proximity of 'local' access tel lines	1	2	3	4	5

Reliability

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Overall reliability of provider	1	2	3	4	5
Ease of installation	1	2	3	4	5
Value for money	1	2	3	4	5
Quality of service provided	1	2	3	4	5
Connection speed	1	2	3	4	5
Response to problems	1	2	3	4	5

General aspects

How satisfied are you with the...?

	Very dissatisfied				Very satisfied
Technical support offered	1	2	3	4	5
Quality of online content	1	2	3	4	5
Availability of search engines	1	2	3	4	5

What is the likelihood of repurchasing from this ISP in the future?

Definitely not				Yes definitely
1	2	3	4	5

What is the likelihood of you recommending this ISP to your colleagues?

Definitely not				Yes definitely
1	2	3	4	5

If you rated 1 or 2 to any of the last 3 questions, what are your main reasons for low satisfaction, not repurchasing and/or not recommending?

.....

Please complete the following details and return the questionnaire to:
Maritz Research (VNU), FREEPOST SL1673, Marlow SL7 1BT

Name: .....
Address: .....
.....
..... **Postcode:** .....
Email address: ..... **Tel no:** .....

How often do you purchase PCW and/or What PC?

1 I am a subscriber to PCW ☐
2 I am a subscriber to What PC? ☐
3 Not a subscriber ☐

How would you best describe your professional role?

1 General Manager/MD ☐
2 IT Manager/Director ☐
3 Technical Support Manager/Executive ☐
4 Purchasing Manager/Executive ☐
5 Other non-IT position ☐
6 Home use ☐

The Michael Hewitt Interview

Tom Kilburn

Baby boom

Tom Kilburn built the Baby, the first digital, stored-program computer. Not the size of your average baby, this sixteen feet long by seven feet high mass of wires is being reconstructed in Manchester. Michael Hewitt meets the proud father.

Tom Kilburn, born in 1921, would like everyone to know that he was educated at Dewsbury Grammar School, Yorkshire, and is "proud of it". More so, indeed, than having read mathematics at Cambridge. However, like a good number of people who come from Yorkshire and are proud of it, he upped and left some time ago. Which is perhaps just as well. If he'd helped develop the world's first digital, stored-program computer in somewhere like Barnsley or Pontefract, the world might have taken it a lot less seriously. Fortunately, he did the deed at my old *alma mater*, the University of Manchester, in 1948.

The beast, which is being reconstructed by the British Computer Conservation Society and ICL, resides in the university's Computer Building on Oxford Road. Sixteen feet long, seven feet high and featuring a ton of diodes, valves, metal racks and lethally bare wires, it looks like something you might end up with if you hired Mr Bean to do your electrics. But if *PCW* had been going in the late forties, this would have been its Editor's Choice. The Small Scale Experimental Machine (SSEM), or "Baby" as it became known, set the standard that others followed.

"It was its ability to store and run programs put in by a user that set the Baby apart from earlier, special-purpose machines like the Colossus or ENIAC," explained Kilburn. "These required mechanical intervention to run programs. For example, you had to change wire connections in the much the same way that operators used to transfer calls on old-fashioned telephone exchanges."

Computers weren't exactly in his blood. Kilburn's first love was in fact pure mathematics, which he studied at Cambridge to MA level. Indeed, but for the intervention of the second world war, the two of them might have consummated the relationship. Instead, however, Kilburn was drafted as a science officer and propelled to the Telecommunications Research Establishment, then based in Malvern, to work on some flash-in-the-pan project called RADAR. It was here, in 1942, that he met his future mentor, Freddie Williams, who was then heading a group of circuit designers.

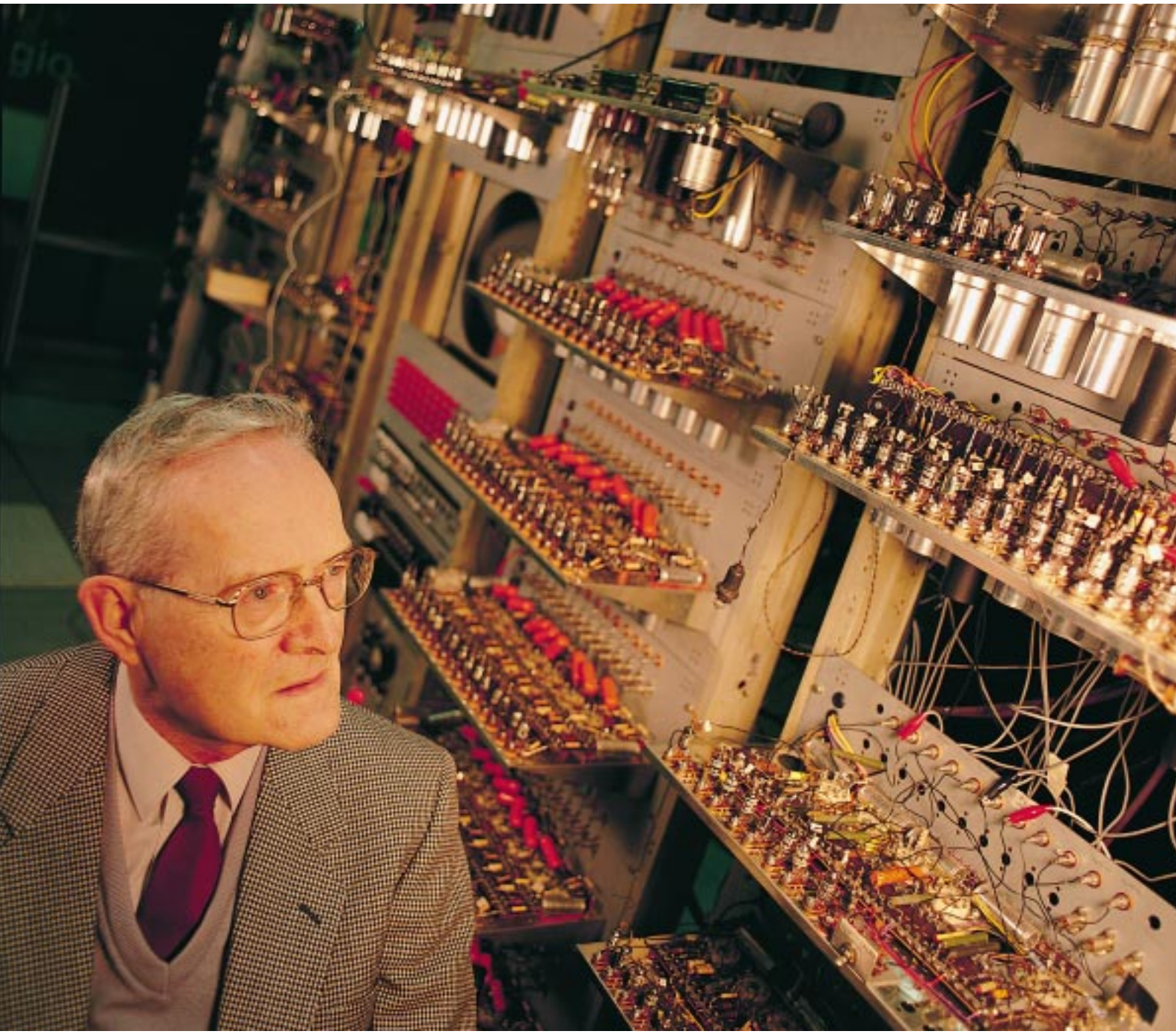
"I was something of a disappointment to him at first. He was expecting a well-qualified electrical engineer, but I was just a mathematician. I didn't know anything. But because our group was so small and because there were so many technical problems to overcome, I was thrown in at the deep end. It didn't take me long to become a reasonable circuit designer, though. I found I actually preferred this hands-on work to the theoretical mathematics I'd been doing before. And, of course, because RADAR was essential to the war effort, you had the feeling you were doing something really useful."

Exit Mussolini, Hitler and Hirohito stage left. Now fast-forward four years to 1946. Thanks partly to his work at Malvern, Freddie Williams had become the best-known electronics circuit engineer in the world and was appointed professor at Manchester University. As such, he was invited to do regular turns at international electronics circuit engineer bashes. At one of these, in the USA, he came across an experiment aimed at storing analogue data using a cathode ray tube. Williams reckoned it was interesting enough to duplicate back at Malvern. He did so, but advanced the experiment somewhat to the stage where he was able to store a single digit, not in analogue but in binary form, as a charged area on the CRT's screen.

Although it worked, no-one understood quite how. More research was therefore required. It was this stage, round about Christmas of 1946, that the whole project was transferred to Williams' department at Manchester University. Tom Kilburn went with it. Still nominally a serving science officer, he was given the authority to requisition as much kit as he liked and kick as many butts as necessary to get everything up and running.

But to get *what* up and running, exactly? The thing they'd created thus far, while it looked moderately impressive and merited write-ups in technical journals, was still basically just a storage device. It was one project among many that were currently ongoing. Then various lightbulbs started illuminating above various heads: what would happen, these heads asked themselves, if you married this new-fangled CRT storage technology with that of an existing valve-based computing machine? Might you not end up with a machine that could be programmed much, much faster than, say, a Colossus or an ENIAC, and which would therefore be far more practical for multiple computing applications?

PHOTOGRAPH by Mark Rayner



Tom Kilburn among the myriad valves and switches that went to make his Baby. Now retired, his interest in computers has not extended to the rampant web-mania of today

"The only way to find out was to try," said Kilburn.

It was far from a one-horse race. Several groups, both in the UK and the USA, were also trying to build a digital computer. They included researchers at Cambridge University, Welwyn Garden City, and, perhaps the best-known name, Alan Turing at the National Physical Laboratories. Kilburn went to one of the NPL's lectures where Turing described how he was getting along. He left unimpressed. "What Turing was saying wasn't of very great interest to me. This wasn't arrogance on my part. It's just that his work wasn't relevant to what we at Manchester were doing. Turing's group was attempting to use mercury delay lines arranged in series as their storage technology. It could take up to 500 milliseconds just to get a single digit out of a mercury delay line, compared to just five microseconds from a cathode ray tube. So, because it had to be built around a somewhat less efficient storage device, his proposed design of computing machine was totally different to ours."

Over a period of six months, Freddie Williams' CRT storage device was augmented with supplementary store, control and arithmetical units. A high-voltage power supply was laid in. Valves and diodes were ordered by the skip-load. Joints were soldered, screws screwed, and plugs plugged in. Then, finally, before an expectant audience, the machine was turned on. It was not quite the unqualified success they'd all hoped for — at first, anyway. To quote the late Freddie Williams: "A program was laboriously inserted and the start switch pressed. Immediately, the spots on the display tube

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"Bear in mind that existing mechanical calculating machines could process, at a maximum, maybe one instruction every two seconds. Ours could process a thousand a second"

entered a mad dance. In early trials it was a dance of death leading to no useful result and, even worse, without yielding any clue as to what was wrong."

One problem was that "noise" from all the valves was causing interference in the CRT storage device. As was some idiot on an unsupressed motorcycle who insisted on riding up the road at the back whenever the machine was turned on. In the good old days back at Malvern, Kilburn could probably have ordered an NCO to go outside and take him out with a high-powered rifle. But in the late forties, with a new people-friendly Labour government in power, this might have been frowned upon. Instead, Kilburn and his team had to put heavy metal shields round the CRT units to protect them. This, together with a certain amount of taking things apart and putting them back together again, eventually did the trick.

On 21st June, 1948: "I'd drawn up a 17-instruction program on a sheet of paper that was intended to find a number's highest factor. It all fitted into a 32 x 32 array, which was the capacity of the CRT. Then I entered this program into the machine via the keyboard. It was a fairly lengthy procedure that took about ten minutes. When I'd finished, I flicked a switch and waited. Suddenly, there on the screen, was the correct answer. It had worked. We all cheered like mad."

But the machine, although it had worked to spec, was "horribly unreliable". If you got an hour's work out of it without a valve blowing or a lab assistant electrocuting himself, it was a good day. But this was history in the making. "There was great excitement," said Kilburn. "Bear in mind that existing mechanical calculating machines could process, at a maximum, maybe one instruction every two seconds. Ours could process a thousand a second. So it was a thousand times more powerful than anything else around at the time."

By today's standards, the Baby is slow and bulky. To give you a for-instance: it's 15 million times less powerful than the latest ICL Trimetra computer, which is itself a distant grandchild of the Baby. Something of similar processing power and memory of the Baby would now fit on to a silicon chip the size of a pinhead. That said, in 50 years' time, our own super-fast Pentiums will doubtless provide a similar source of mirth. Such is progress.

Competition: write a program for the SSEM

To celebrate the 50th anniversary of the Baby, ICL and the British Computer Conservation Society are running a competition where programmers, both experts and novices, are invited to write a software program for the SSEM. Entries must be in by 31st March 1998. A panel chaired by Tom Kilburn will judge the entries. The winner will be invited to run his or her program on the SSEM when it goes live on 21st June. Information on how to program the SSEM, the competition rules, and a simulator written by the University of Manchester, can be downloaded to a Windows-equipped PC from www.cs.man.ac.uk/prog98/

Anyhow, news of the Baby's success travelled fast. American engineers, familiar with much of Williams' work, immediately christened the Williams and Kilburn CRT store the "Williams Tube". This terminology soon became the generic term for the invention. In 1951, Ferranti rebuilt the Baby as the Ferranti Mark I commercial computer. In the States, the CRT store formed the basis of the first IBM computers, the 701 and 702, in 1953. Indeed, the technology was still going strong into the early sixties, before eventually being superseded by the invention of magnetic core storage and, of course, transistors.

"I count transistors as being one of the most significant developments during my time with computers. But of much more lasting importance than that was the invention of the index register, just two weeks after the Baby first performed to order. This allowed you to have subroutines in programs. And from this stemmed the concept of virtual memory, a term which first came to use, again in Manchester, with the creation of a machine called the Atlas. I believe virtual memory will exist as long as computers exist."

In 1948, Kilburn was awarded a PhD for his work on the CRT store. In 1953, Manchester University awarded him a Doctor of Science degree. He stayed on as lecturer in the Electrical Engineering Department, before going on to found the Computer Science Department, of which he became the first professor. This department went on to design many machine architectures which have had their own impact on the development of computing. Tom Kilburn retired in 1981, but he still pops in to see how things are going and to keep his hand in. But perhaps curiously, he isn't particularly interested in modern computer offshoots such as the internet. How come?

"My interest in technology has always been in looking at ways to make it more efficient. When we finished the Mark 1, for example, I could, I suppose, have just spent the next few years writing programs for it. However, I saw that there was a lot of scope for improvement. So I set about building a machine called the Mercury, which was 30 times more powerful than the Mark 1. And having built the Mercury, I could then see how I could build a machine 80 times more powerful even than that. All my life, I've concentrated on thinking about how things could be improved. The present stopping point is the internet. If I were young again, I wouldn't be wasting my time netsurfing. I'd be trying to imagine what was coming after the internet, and planning for it."

After his work in RADAR, his associations with Freddie Williams and his contribution to computing milestones, when Kilburn sees these pimply youths playing Tomb Raider and downloading naughty gifs, does he wonder why he bothered? He smiled and shook his head. "It's a different world," he said. "Every man to his own.. every man to his own." ■


£500
Cash points
£1000

PC Photography by David Whyte. Illustration by Paul Shorrock

To celebrate our twentieth anniversary we've rounded up twenty PCs at four price points to see just what you'd get for your money.

Flicking through the pages of *PCW* reveals wide variations in the prices of PCs. Within the space of a dozen pages you can spend anything from £340 to sums well over the £3,000 mark in buying yourself your budget PC/office workhorse /dream machine (delete as appropriate).

So what difference does the extra money make, and more to the point, do you really need that difference? Do your applications actually require the extra memory, faster speed and Intel architecture that you might not get if you opt for a minimum spend, or would they work just as happily on a much more conservatively specified machine?

To celebrate our twentieth anniversary *PCW* decided to answer these questions in style. Taking twenty PCs — five each from the £500, £1,000, £1,500 and £2,000 price bands — and subjecting them all to the same rigorous business application tests, we compared what each price point could achieve and who could do us the best deal. Once the PCs had completed this first round of testing they were then subjected to VNU Labs' rigorous Final Reality benchmark to tax their 3D rendering skills, before being taken apart for a close-up inspection.

The results are detailed in the following pages and they provide some surprising answers. We were glad to see that all were Millennium compliant so, apart from the cost of entry to the Greenwich Dome, the year 2000 should provide no nasty surprises. Many users buying a PC predominantly for games might think they could go for the cheapest on the market; but do the Final Reality scores confirm this? Business users may be under the impression that powerful applications will only run on expensive hardware. What do the BapCo results have to say about that?

Whatever your budget — whether you're a first-time buyer, a home user looking to supplement an existing machine, or a college, business or organisation after new PC hardware — this month's *PCW* group test tells you everything you need to know.

■ **Compiled by Nik Rawlinson, Paul Trueman and Lynley Oram**

Ratings

★★★★★	Buy while stocks last
★★★★	Great buy
★★★	Good buy
★★	Shop around
★	Not recommended

PCs Contents

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£500

Some of the cheapest desktop PCs ever reviewed in *PCW* have made it into this month's group test. Specifying nothing other than a price point — £500 excluding VAT or as near as they could make it — we asked five suppliers to surprise us and show us what they could do on a tight budget*. In most cases we were impressed by the results. High-performance sound cards and quality speakers, large hard drives and generous memory installations and, in most cases, a well laid-out interior proved that it was not necessary to spend vast amounts of money to get your hands on a perfectly serviceable machine.

So who would buy a PC in this price bracket? The obvious answer is home users looking for either their first PC or a machine to supplement one already in the household, or students on a budget who need a simple but effective means of presenting their work. First-time buyers often spend far more than they need in buying a machine that far exceeds their requirements. These machines prove that for less than £600 all-in some users can buy a computer that will do everything they need and more.

A second major market for a PC of this price is the hobbyist, somebody who does not mind tinkering with their purchase, increasing the amount of memory or the size of the hard drive as they go along. For them, a £500 PC will form the basis of what will ultimately be a machine built by themselves to suit their exact requirements. The freedom to open a cheap PC and restructure its insides without the worry of damaging something that cost thousands to purchase, is a liberating experience.

The third and perhaps most important market for this type of PC is that in which companies or organisations need to purchase a considerable number of machines at a good price. Schools and colleges frequently have to update their equipment within tight budgetary constraints, so a cheap PC that will do most things something four times the price will achieve, will be immediately attractive. Further, they often do not need the extra graphics-card memory or super-fast processor that the extra expenditure would buy them and so would be happy to settle for something slightly less "cutting edge". So sit back, check your bank balance, and be pleasantly surprised at what you didn't know you could afford.

** Price includes delivery.*

Extreme Computers Ultimate Pro

The processor at the heart of the Extreme PC was a Cyrix chip with 512Kb pipeline burst cache and it was extremely quiet in use. A nice Windows 95 keyboard compensated for the rather plain mini tower case and disappointing mouse which was connected with a 9-pin serial plug, using one of the two COM ports and leaving only the 25-pin connector free.

One free external 3.5in bay, one internal bay of the same size and a further free 5.25in external bay gave plenty of opportunity for expansion, but although most cabling was fairly neat it had been folded into the internal bay, effectively putting it out of use. It also obstructed the two free 72-pin and three free 168-pin memory slots, making it awkward to improve on the 16Mb supplied, but on the positive side they were kept clear of the three free PCI, one free ISA and one free shared expansion slots. The memory had been supplied in the form of two 8Mb SIMMs and the hard disk was sized at a decent 2Gb.

The sound card was very basic with no line-out option, and while the unbranded speakers were capable of high volume, the quality of the output was tinny and at times made them rattle. There was no bundled software, which was not really expected at this price, but we were disappointed that it also lacked a user manual and, although we received the Windows 95 CD, there was no startup disk. The only documentation received comprised the standard Windows 95 manuals.

The unbranded 14in Hansol monitor was disappointing, flickering noticeably even at resolutions as low as 800 x 600. Driven by a GraphicsBlaster card with 2Mb onboard it utilised no on-screen controls but instead indicated what was being altered using a series of bulbs on the fascia. Separate rotary brightness and contrast controls complement the fast access to degauss and factory reset buttons.

PCW Details

Price £601.58 (£499 ex VAT)
Contact Extreme Computers 01709 701200 www.extreme-computer.co.uk
Good Points Nice keyboard. Fairly good performance.
Bad Points No manuals. Poor monitor.
Conclusion A sturdy machine that performed well.

Build Quality	★★★½☆
Performance	★★★★½
Value for Money	★★★★½
Overall Rating	★★★½☆

Fox Computers Family 200MX Extra

The messy interior of this Intel 200 MMX-based PC was dominated by a bundle of cable obstructing easy access to the 16Mb memory which was in turn supplied on two SIMMs, leaving two SIMM and two DIMM slots free. Two free PCI, a free ISA and a free shared slot catered for future expansion, while two free external 5.25in and one each of an internal and an external 3.5in bay would allow us to add more drives to the attractive case at a later date.

The keyboard was a good-looking, slimline, low-profile model that was pleasant enough to use throughout our tests. We were disappointed when it came to the Ice Mouse, which was not a nice mouse: a small three-button affair on which the right-click would not work. Even installing the drivers from the accompanying disk made no difference, and as it was a serial mouse it left the PS/2 socket, supplied with the parallel port, unused.

The unbranded speakers had a maximum output of 50W but we were almost instantly put off by the poor sound quality they produced in our tests. AudioRack software was supplied on several disks to cater for a variety of Windows versions. Although this PC performed adequately in our Final Reality tests and did well when running Quake, its handling of business applications was disappointing, with Fox scoring lower than any other manufacturer in this category.

The 14in Axion monitor had a very curved screen. All alterations were made using the front-mounted rotary controls which meant that, although we lost the ability to degauss or select different colour temperatures, we were afforded instant access to the most common functions you would expect from a monitor. Parallelogram and pincushion options supplemented the usual position and size controls but there was no "rotation" control, which was a shame as the picture on our monitor was slightly crooked.

PCW Details

Price £645.85 (£549.66 ex VAT)
Contact Fox Computers 0990 744500
www.fox-computers.com
Good Points Good-looking machine.
Bad Points Messy interior. Poor mouse and speakers.
Conclusion A disappointing, slow PC.
Build Quality ★★★☆☆
Performance ★★☆☆☆
Value for Money ★★★☆☆
Overall Rating ★★★☆☆

Linear Computers Linear Excel

Personal Computer World Highly Commended

The squat case of this IBM 200 MMX-based PC could almost be described as beautiful, certainly in comparison to many others on the market. The unfortunate pay-off for its convenient size was the limited number of free drive bays: merely one 3.5in and a 5.25in, both of which were external. The tidy interior gave easy access to the processor and free memory slots, but a slight lack of thought meant that the CD audio cable was stretched tightly across the two free PCI, one free ISA and single free shared expansion slots. We were glad to see that 32Mb memory was installed on a single DIMM, leaving a further DIMM slot free for increasing the already generous allocation at some time in the future.

The ports on the rear of the machine were unlabelled and one of the pins on the larger of the two serial ports was bent. We were also disappointed that as in the case of other machines in this test, a PS/2 port had been supplied but left vacant through the use of a serial mouse. Provision had not been made in the boot-up sequence for DOS-based CD-ROM use and so without changing our boot-up files we were confined to using the 24-speed drive through Windows only.

F-PROT Professional 95 was pre-installed to stand guard over possible virus invasion, and the keyboard, although not particularly responsive, was quiet and certainly more comfortable to use than some of the models supplied with more expensive machines. The unbranded speakers, capable of a maximum output of 160W, performed admirably and did not distort at high volume, as well as looking impressive and incorporating fascia controls for volume, treble and bass adjustments.

The 14in Hansol Mazellan 400A monitor had no OSD but instead used a series of icons and LEDs on the bezel to indicate what we were changing. Dedicated buttons gave instant access to degauss and factory reset while separate rotary controls allowed us to adjust contrast and brightness. The flicker-free image was pleasant to view, leaving Windows icons and small text well defined.

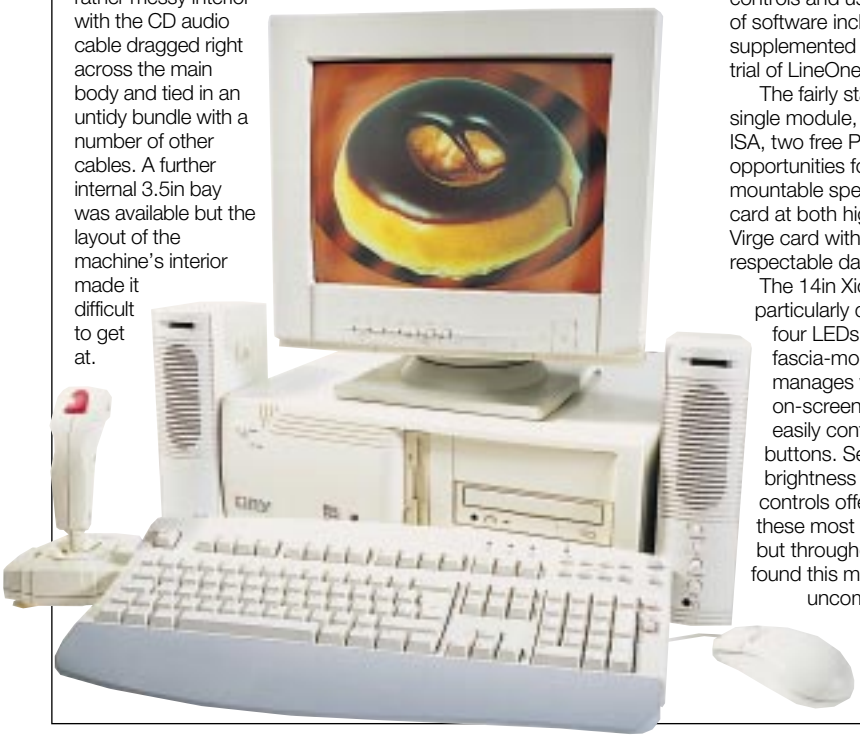
PCW Details

Price £603.95 (£499 ex VAT)
Contact Linear 0800 622094 (no URL)
Good Points Case. Memory configuration. Speakers.
Bad Points Slightly limited free bays.
Conclusion An impressive performer that looks good.
Build Quality ★★★★☆
Performance ★★★★★
Value for Money ★★★★★
Overall Rating ★★★★☆

p196 ➢

Tiny Home Value System

For those with limited space, the attractive desktop case of this Intel 233MMX machine would tuck away nicely under any monitor and still leave room to house external 3.5in and 5.25in bays. Gaining access was a simple, single-screw operation but it revealed a rather messy interior with the CD audio cable dragged right across the main body and tied in an untidy bundle with a number of other cables. A further internal 3.5in bay was available but the layout of the machine's interior made it difficult to get at.



An excellent set of manuals was supplemented by a series of quick-reference sheets giving guidance on many common tasks. They also led us through using the additional multimedia buttons on the outstanding keyboard that offered direct access to volume, CD controls and user-definable software shortcuts. A generous selection of software including Encarta 98 and Money 98 was pre-installed and supplemented by the original CD-ROMs, as was the software for a free trial of LineOne, somewhat redundant without a modem.

The fairly standard 16Mb memory was supplied in the form of a single module, leaving a slot free for a further 168-pin DIMM. Two free ISA, two free PCI and a further free shared slot offer plenty of opportunities for expansion and the unbranded 180W monitor-mountable speakers provided undistorted output from the ESS sound card at both high and low volumes. Graphics arrived courtesy of an S3 Virge card with 2Mb RAM while the 3Gb hard drive attained a highly respectable data transfer rate of 7455Kb/sec.

The 14in Xiod monitor, which was set to 640 x 480 on arrival, was particularly disappointing, with a grainy image at all resolutions. With four LEDs beneath a set of fascia-mounted icons it manages very well without on-screen controls and is easily controlled by just three buttons. Separate rotary brightness and contrast controls offer direct access to these most common functions but throughout our tests we found this monitor to be uncomfortable to look at.

PCW Details

Price £844.83 (£719 ex VAT)
Contact Tiny Computers 0800 821333 www.tinycomp.co.uk
Good Points Space saving. Documentation. Software.
Bad Points Disappointing monitor. Messy interior.
Conclusion Priced well above the competition.

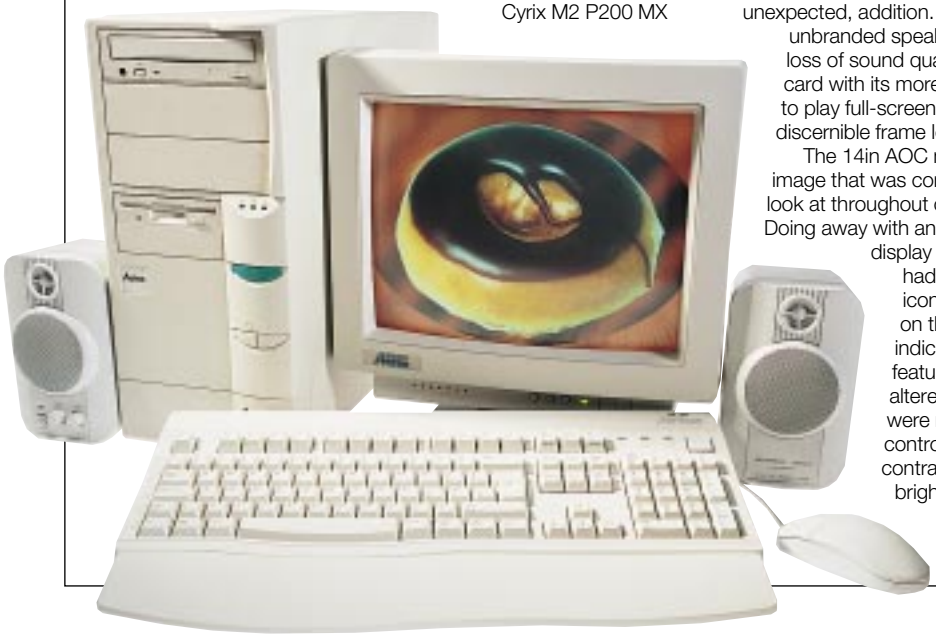
Build Quality	★★★☆☆
Performance	★★★☆☆
Value for Money	★☆☆☆☆
Overall Rating	★★☆☆☆

Watford Electronics Aries Multimedia Pro

Personal Computer World Editor's Choice

One of the more attractive cases in the group of entry-level machines tested, the Watford mini tower covered a particularly tidy interior in which all cables, including the CD audio cable which is often strewn across the expansion slots, were neatly tied into place. The comfortable Windows 95 keyboard, incorporating a wrist-rest and an ergonomic mouse, completed a well thought-out design.

The parallel and PS/2 ports, as with many of the machines in this group, were supplied on a blanking plate and we were disappointed that the PS/2 port was left unused, with the serial mouse taking up one of the two COM ports. The Cyrix M2 P200 MX processor is complemented by 32Mb RAM, wisely provided in the form of a single 168-pin SDRAM, leaving the other SDRAM slot free for future upgrades. Two free PCI, one free ISA and one free shared slots offered plenty of scope for future expansion, as did the two free external 5.25in, two free internal and one free external 3.5in bays. The 2Gb hard drive attained a data transfer rate of just over 1Mb per second in our tests.



A generous bundle of five CD-ROMs including Lotus SmartSuite 97 and Comptons Interactive Encyclopedia were a pleasant, although unexpected, addition. The sound card drove a pair of chunky unbranded speakers to impressively high volumes with minimal loss of sound quality. Meanwhile, the ATI 3D Xpression graphics card with its more than adequate 4Mb onboard RAM allowed us to play full-screen MPEG video at high resolution and with no discernible frame loss.

The 14in AOC monitor gave an impressively sharp, flicker-free image that was comfortable to look at throughout our tests. Doing away with an on-screen display it instead had a series of icons and LEDs on the fascia that indicated the feature being altered. There were no separate controls for contrast and brightness and it provided no option to degauss.

PCW Details

Price £703.82 (£599 ex VAT)
Contact Watford Electronics 01582 745555 www.watford.co.uk
Good Points Bundled software. Monitor. Performance.
Bad Points PS/2 port unused by serial mouse.
Conclusion A great PC all round.

Build Quality	★★★★☆
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★★

p199 ➢

Editor's Choice

Personal Computer World Editor's Choice

After testing these five PCs we have to ask ourselves why anybody should pay more than £500 (ex VAT) for a computer when spending just that would probably suffice. The performance-test results of many of these machines, in particular those submitted by Watford and Linear, were impressively high. Although they did less well than some of the more expensive machines when it comes to playing games such as Quake, nobody can argue with their scores when running standard business applications such as Word, PowerPoint and Excel, as indicated by the BapCo score.

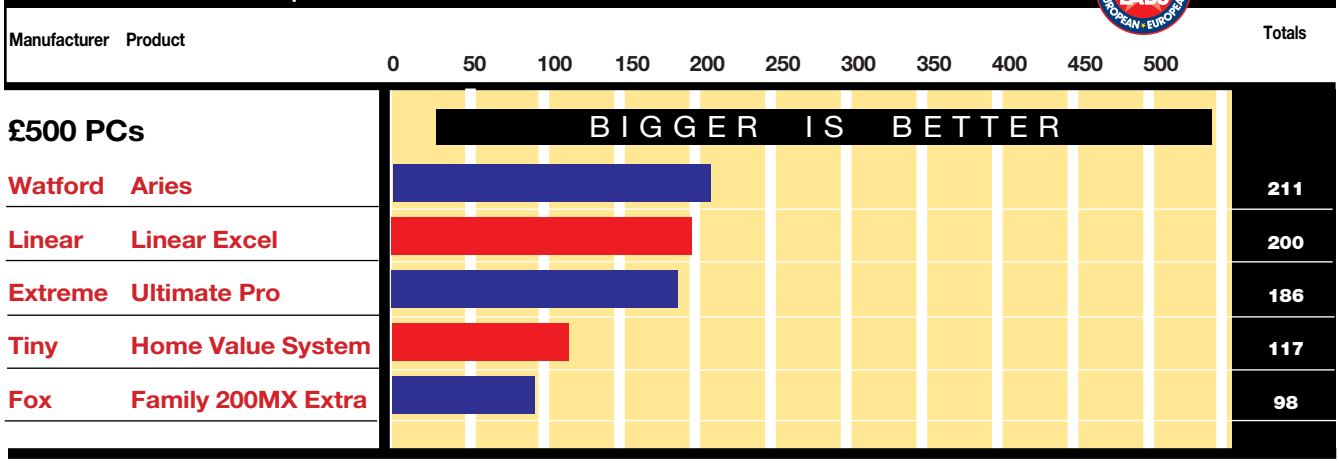
The standard of monitors varied but the AOC Spectrum supplied by Watford was particularly impressive. The sharp, flicker-free image was steady in use and easily controlled using the instant access buttons. The 4Mb graphics card, meanwhile, was more than enough to drive full-screen CD-based video. With 32Mb of memory, the Linear and Watford machines should both last most users a year or two without the need for much in the way of upgrades. More expensive machines include this as the standard memory quota. Tiny impressed us with the generous software included in its system. Encarta 98, Money 98 and Works 4.5 should get business users up and running right away, while by including the likes of 3D Movie Maker, Space Station Simulator and Flight Simulator 98 Tiny has acknowledged that many purchases are likely to be geared towards home use.

We award a **Highly Commended** to **Linear** for its **Excel**. Its business-software results were the second fastest and this PC felt sturdy and well built. Due to a last-minute cancellation Linear had only two days' notice yet it managed to supply this machine on time with no evidence of a rushed job. It performed well in the VNU Labs Final Reality Benchmark that examined its 3D graphics-handling capabilities, attaining a score of 1.42 Reality Marks which places it again in second place.

Watford Electronics impressed us with its attractive, feature-packed, well-built, entry-level **Aries Multimedia Pro** and earns an **Editor's Choice** award. An excellent pack of software including Lotus SmartSuite 97 meant we were able to use full versions of powerful business applications as soon as the PC was unpacked. Again, it benefitted from a full 32Mb RAM which probably accounts for its excellent BapCo and Final Reality performance where, although it slightly underachieved with Quake, it came first in both categories. Overall, every supplier in this group deserves an honourable mention when you consider that they have put together systems for less than what some suppliers charge for monitors.

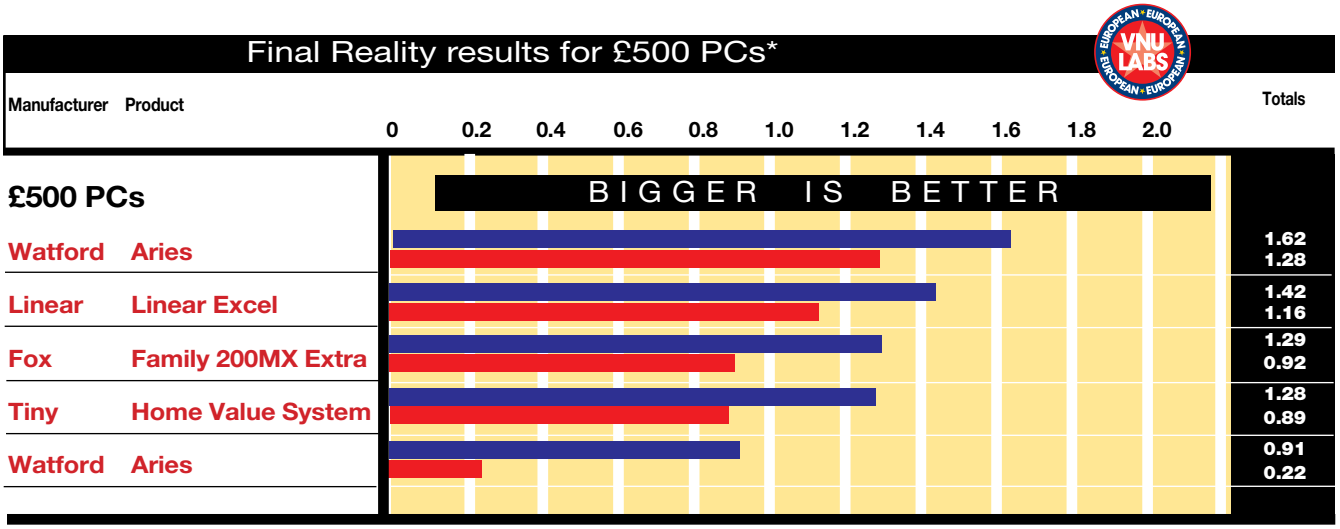
BapCo results for £500 PCs

VNU LABS



Final Reality results for £500 PCs*

VNU LABS



p201 >

Table of Features

Personal Computer World Highly Commended

Personal Computer World Editor's Choice

Manufacturer	Extreme	Fox Computer System	Linear	Tiny	Watford Electronics
Model	**Ultimate Pro**	**Family 200MX Extra**	**Linear Excel**	**Home Value System**	**Aries Multimedia Pro**
Price with delivery (inc. VAT)	£601.58	£645.85	£603.95	£844.83	£703.82
Price with delivery (ex. VAT)	£511.99	£549.66	£514.00	£719.00	£599.00
Telephone	01709 701200	0990 744500	0800 622094	0800 821333	01582 745555
Fax	01709 700093	0990 502207	0181 641 8862	01293 822514	01582 488588
URL	www.extreme-computer.co.uk	www.fox-computers.com	N/A	www.tinycomp.co.uk	www.watford.co.uk
Sales hours	10-7 M-Th(6-F)(5 Sat) 12-2 Sun	9-7 M-F 10-5 Sat 10-4 Sun	9am - 7pm	9-5:30 M-Sat 10-4 Sun	9-7 M-F 9-6 Sat
Technical support hours	11-7 M-F 12-2 Sat	9-5 M-F	9am - 7pm	9-5:30 M-Sat	9-5 M-F 10-4 Sat
Standard warranty	1 yr RTB (Monitor 3y OSM)	5yr 1yr=RTB 4yr=RTB Lab	1yr OSM + 2yr coll + rtn	1yr collect & return pts/lab	1yr OSM 5yr RTB Labour
Warranty options	£19.99 for 1yr OSM	N/A	N/A	On-site up to 3yrs	N/A
Hardware Spec					
Processor	Cyrix 200MX	Intel Pentium 200MMX	IBM 200MX	Intel Pentium 233MMX	Cyrix 200 MX
RAM	16Mb	16Mb	32Mb	16Mb	32Mb
RAM type/pins	EDO/72	EDO/72	SDRAM/168	EDO/168	SDRAM/168
Hard disk	Fujitsu	Seagate	Samsung	Fujitsu	Quantum
Size(Gb)/acc time(ms)/int	2.1Gb/10ms/UDMA	1.7Gb/11ms/UDMA3	2.5Gb/9ms/UDMA	3.2Gb/10ms/EIDE	2.1Gb/10ms/EIDE
Motherboard Components					
Motherboard manufacturer	Pine	Gigabyte	Gigabyte	Tiny	DFI
Motherboard model	ACER TX Mainboard	430TX	GAJ86	TX5	586 ITBD
Chipset	430TX	430TX	430TX	430TX	430TX
L2 cache	512K	512K	512K	512K	512K
Expansion and I/O					
Spare bays 3.5in/5.25in	1x3.5in/1x5.25in	2x3.5in/2x5.25in	1x3.5in/1x5.25in	1x3.5in/1x5.25in	1x3.5in/2x5.25in
PCI slots/ISA slots/sh slots	4PCI/3ISA/1shared	3PCI/2ISA/1shared	2PCI/1ISA/1shared	4PCI/4ISA/1shared	3PCI/2ISA/1shared
USB/serial/parallel/PS2	2USB/2S/1P/PS2 optional	0USB/2S/1P/1PS2	0USB/2S/1P/1PS2	2USB/2S/1P/2PS2	2USB/2S/1P/1PS2
Multimedia					
CD-ROM manufacturer	Hitachi	Goldstar (LG)	Unbranded	Panasonic	Goldstar (LG)
CD-ROM speed/interface	16x/IDE	24x/IDE	24x/IDE	24x/IDE	24x/IDE
Sound card manufacturer	Pine	BTC	Flagpoint	ESS	Aries
Sound card model	1868 ESS	16 P&P inc 3D	ESS 1868	1869	Yamaha 16bit
Speakers	30W Standard	50W Active	125W	Juster 180W PMPO	25W Amplified
Graphics & Monitor					
Graphics card	Cirrus Logic 5446	S3 Verge PCI	S3 Virge	S3 Virge DX	ATI Expression
Graphics card RAM	2Mb	2Mb	4Mb	2Mb	4Mb
Monitor model	Hansol	Axion	Hansol 400A	Samsung	Aries Energy Pro 14
Monitor size (inches)	14in	14in	14in	14in	14in
Max rfsh rate @ 800 x 600 (NI)	75Hz	75Hz	75Hz	75Hz	80Hz
Other Information					
Modem make	N/A	N/A	N/A	N/A	N/A
Modem speed (Kbps)	N/A	N/A	N/A	N/A	N/A
Other extras	N/A	N/A	N/A	N/A	N/A
Software	Windows 95	Windows 95	Windows 95	MMX Bundle	Lotus SmartSuite 97
				Microsoft Family 98	Comptons Encyclopedia
				Intel Antivirus	Windows 95
Year 2000 compliant?	●	●	●	●	●

● Yes ❍ No

p204 ➢

£1000

This section of the group test looks at PCs priced at around £1,000 excluding VAT*. This relatively low price point perhaps suggests a lack of speed and power that the performance of some of these PCs belies. If you are looking to get your hands on a powerful PC for use in the office or home, given the recent price drops in memory and Intel's PII processors, it is worth considering PCs around this price. The machines we received were all of a relatively similar technical specification and were as capable of running 2D office applications as they were of calculating images for the latest 3D games.

If you want a PC for business use that can connect up to other networked PCs, on which you can run office applications, spreadsheets and database or check on your company's web site, then a PC priced at £1,000 could be what just what you're looking for. Obviously, if it is processing-intensive tasks you need a PC for, to do CAD work for example, you will need to look elsewhere, bulging wallet at the ready. If it is the more common office tasks that you intend to use your PC for, then all of the machines in this group test are fitted with 64Mb SDRAM as well as PII processors and as such there isn't going to be much tangible improvement in performance running most office software, even if you were to spend closer to two thousand pounds on a more powerful machine. On the other hand, we also examine PCs that aim to cater for the whole family. For the same price tag of £1,000 (ex VAT) you can take possession of a powerful PC with impressive AGP graphics and bundled goodies such as games joysticks and software that will turn your PC into the perfect tool for family learning, finance and a fair dose of fun. Happily for the consumer, these bundles are not produced by skimping on the standard or size of hardware such as memory and hard drive.

So whether you are looking to update the machines in your office, buy a single PC for your own SME (small to medium enterprise) or you want a computer that will please every member of your family, check these machines out. You may well find yourself pleasantly surprised.

** Prices do not include delivery.*

Carrera Power Pro II

The Power Pro II arrived with a similar set of technical specifications to the other systems in this price range: 64Mb of SDRAM, a PII 233 processor and the seemingly omnipresent ATI Xpert@Work AGP card. Like all the machines we saw in this price range, the Carrera was commendably orderly and neat inside. Access to the three DIMM slots was very easy, with none of the awkward wires and IDE connections that can sometimes cause frustration when you're upgrading processor, memory and add-in cards.

In terms of performance, the Pro II did well in two of the three tests we put it through. It was second only to the more powerful PII 266 Mesh PC in the BapCo test, and with a score of 257 it outperformed the other three PII 233 machines. The Pro II also scored well in 3D performance in the Final Reality test, but did less well in the Quake test.

This PC came with a wealth of information and drivers, which isn't always as common an occurrence as you might think: it is surprising how often we are sent PCs that don't include drivers for all of the fitted components. This isn't a problem, of course, as long as you don't plan on reinstalling Windows. Frustratingly, the boot disk that Carrera included was yet another disk that lacked MSCDEX drivers for the CD drive, making it impossible to load up the Windows 95 operating system from the CD.

The LG Studioworks 57i monitor was fairly impressive, with its 13.8in of viewable screen from a 15in monitor and excellent on-screen controls. It was capable of a refresh rate of 85Hz at 1,024 x 768 resolution, and unlike many other 15in screens the picture did not suffer from blooming.

PCW Details

Price £1,173 (£999 ex VAT)
Contact Carrera 0171 830 0486
www.carrera.co.uk
Good Points A powerful machine that performed well with both 2D and 3D applications.
Bad Points No surprises or "extras" in terms of hardware or software.
Conclusion A good machine for the price.

Build Quality	★★★★☆
Performance	★★★★☆
Value for Money	★★★☆☆
Overall Rating	★★★★☆

Dabs Navigator II

The PC Dabs submitted for this group test was slightly disappointing on initial impressions. On first setting up the PC we were surprised to find that of the standard two power cables Dabs had sent us, one was designed for a foreign socket fitting, rendering it useless in the UK. When that had been sorted out we tried to switch everything on, only to find that there was no response from the monitor at all. Not a promising start. It turned out that the AGP graphics card had come loose, possibly in transit, and normal service was resumed after we reseated the card. We began to believe in jinxes when we discovered that the keyboard's lead didn't fit into the PS2 socket on the back of the PC. We happen to have a supply of adapter leads at *PCW* — which is lucky, because Dabs hadn't included one.

Once up and running the Navigator II performed powerfully in the BapCo tests but, while it scored respectably in the Quake graphics test, the 3D scores in Final Reality were somewhat less impressive. The overall technical configuration was similar to the other machines in this price bracket, with an Intel Pentium II 233 processor and 64Mb SDRAM, but they provided a 33Kbps modem and a 3.2Gb hard drive compared to some manufacturers' 56Kbps modems and 6.4Gb hard drives. The software bundle comprised Lotus SmartSuite 97 and Corel's CorelDraw 4 bundle.

With three spare 5.25in expansion bays, two forward-facing and another three free 3.5in bays, there was plenty of room inside the huge ATX midi tower case for anyone looking to add Zip drives or additional hard drives perhaps. This sense of space was extended to the Abit motherboard, with one of three ISA slots free, all four PCI slots empty and all 64Mb of the SDRAM on the one slot, leaving the other three DIMM slots free.

The Belinea 15in monitor was capable of a healthy 85Hz at 1,024 x 768 resolution, although this meant loss of focus and halos on some icons. There was also noticeable blurring around the top corners of the screen, even at 800 x 600.

PCW Details

Price £1,173 (£999 ex VAT)
Contact Dabs Direct 01942 794000
www.dabs.com
Good Points Plenty of room for anyone wishing to expand.
Bad Points There were numerous hassles in setting up this PC.
Conclusion It would have had to be an incredible machine to make up for its poor start. It wasn't.

Build Quality	★★★☆☆
Performance	★★★☆☆
Value for Money	★★★☆☆
Overall Rating	★★★☆☆

Mesh Elite 266XM

Personal Computer World Highly Commended

The Mesh PC came with a technical specification so hefty it could have worn a hat and a cape and been called "Big Daddy". For starters there was an Intel Pentium II 266 processor and 64Mb of fast SDRAM memory. There was also a whopping 6.4Gb hard disk and a 56K US Robotics X2 modem. The graphics were provided by an onboard 4Mb ATI Xpert@Work AGP chip. We don't get sent many desktop PCs for our group tests but it's interesting to see a slightly different machine, and anyway, it all comes down to personal choice in the end. We liked the look of this machine.

Inside, the Elite was neat and orderly with all four PCI slots free, along with the two ISA slots that were taken up with a SoundBlaster AWE 64 sound card and the modem.

Our one criticism of the ASUS P2L97A motherboard was that there was no AGP slot fitted and so upgrading the AGP graphics is not an option. However, the 4Mb currently on the Xpert@Work is pefectly adequate.

Mesh presented an impressive package with all hardware information and drivers bundled in a branded plastic pack, and a large poster as a guide to setting up the PC to reassure the technologically wary. As well as the impressive hardware Mesh has included Lotus SmartSuite 97 and IBM's Simply Speaking voice-recognition software, along with a microphone.

The Elite scored impressively in both our BapCo and Final Reality tests, and there is plenty of space on the 6.4Gb hard drive for all those memory-hungry 3D-rich applications that we keep hearing so much about.

The 15in Taxan Ergovision 550 monitor had wonderfully user-friendly controls and managed a rock-solid refresh rate of 85Hz at 1,024 x 768 resolution. The picture itself was impressively sharp with crisp, bright colours.

PCW Details

Price £1,173 (£999 ex VAT)
Contact Mesh 0181 452 1111
www.meshplc.co.uk
Good Points A tremendous set of specifications for the price.
Bad Points No AGP slot.
Conclusion A powerful machine that will perform as well as a business or games PC.

Build Quality	★★★★☆
Performance	★★★★☆
Value for Money	★★★★☆
Overall Rating	★★★★☆

p206 ➢

Roldec Predator 233

Roldec's Predator 233 was kitted out with an Intel Pentium II processor, 32Mb SDRAM and a 3.2Gb hard disk. This is a little skimpy compared with the other machines reviewed: all had 64Mb SDRAM and a couple had 6.4Gb hard drives. Also included was the rightly revered SoundBlaster AWE 64 sound card from Creative Labs, a 32-speed TEAC CD-ROM drive, a 56K Rockwell modem and the superb STB Velocity 128 AGP card with TV support.

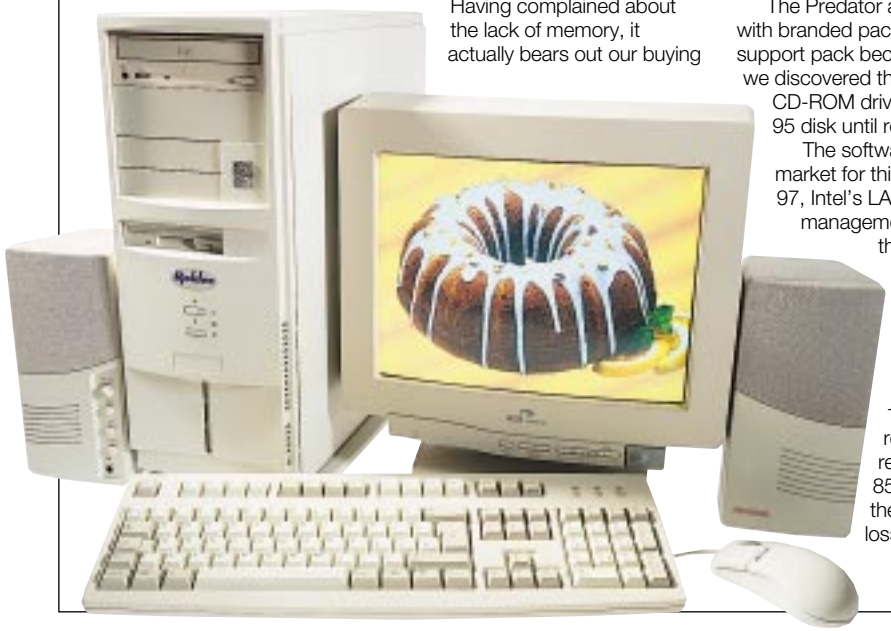
The Predator scored very impressively in our Quake test and nosed into fourth in the BapCo test. Having complained about the lack of memory, it actually bears out our buying advice when it comes to Windows 95 machines: more than 32Mb of memory does not necessarily mean greatly increased performance. (Windows NT certainly benefits from extra memory, as will, in all likelihood, Windows 98.)

There was plenty of room for expansion with all four PCI slots free, as well as free 3.5in and 5.25in forward-facing bays. The graphics are provided by an AGP card rather than being soldered on to the motherboard, so it is possible to upgrade the AGP card if and when necessary.

The Predator arrived as part of a well-presented package complete with branded packs full of drivers and information. A flaw in Roldec's support pack became apparent when we tried to reload Windows 95: we discovered that Roldec's start-up disk didn't include drivers for the CD-ROM drive, meaning that we could not access the Windows 95 disk until replacement drivers were found.

The software Roldec included indicated that the intended market for this PC is the office user. Along with Lotus SmartSuite 97, Intel's LANdesk management software and the graphics package, MGI Videowave SE, were present.

The ADI 15in ProVista E40 could support a 1,024 x 768 resolution at a refresh rate of 85Hz, although there was a slight loss of focus.



PCW Details

Price £1,173 (£999 ex VAT)
Contact Roldec 01902 456464
www.roldec.com
Good Points A decent performer.
Bad Points A shame that the less powerful specification wasn't compensated for by bonus peripherals and software.
Conclusion Worth considering.

Build Quality	★★★★☆
Performance	★★★★☆
Value for Money	★★★☆☆
Overall Rating	★★★★☆

Time 233-2 Professional PC 15"

Personal Computer World Editor's Choice

Time Computer Systems, along with Colossus and MJN, is one of three companies owned by holding company Granville Technology, and each company targets a different market. Time sells primarily to the home user and has numerous packages with fixed price points. Acknowledging this, we accepted the system Time sent, price £1,068 (ex VAT), despite it exceeding our requirement. While it was marginally more expensive than the other PCs in this category, Time had undoubtedly provided a very impressive configuration: an Intel Pentium II 233 processor, a huge 6.4Gb hard drive and the excellent ATI Xpert@Play AGP graphics card.

As soon as we started to unpack the machine we became aware of the high bang-per-buck ratio Time had provided for the home user: a Quickshot joystick, a video guide to using a PC, a Softpack CD compilation of ten edutainment titles and a bundle of five bestselling PC games from the last couple of years, including Command and Conquer and Theme Hospital. Pre-installed software comprised Lotus SmartSuite 97 and IBM Voicetype, along with graphic art, DTP and home organisation software. The only drawback is that you have to make your own backups of these titles (several dozen floppies required) or pay Time £99 for a CD.

In a nice touch for gamers, Time's engineers have tweaked the Windows 95 boot menu so that, when starting up, the PC will ask you if you want to go straight to Windows or play games. If you choose to play games it will give you a list of ways for the memory to be configured to get the maximum performance from the machine. Should you wish to tinker with the Time's innards there is support on hand via the excellent accompanying Application of Technology pack, with information on both software and hardware.

The CTX 1569 SE 15in monitor provided one of the best pictures of the 15in screens we saw in this group. It was capable of a pin-sharp resolution of 1,024 x 768 at 85Hz refresh rate, with none of the lack of focus that we saw on other screens.

PCW Details

Price £1,254 (£1,068 ex VAT)
Contact Time 0800 771107 (no web site)
Good Points Excellent features for family users.
Bad Points Bear in mind that it is slightly more expensive than the other machines.
Conclusion An excellent combination of software and hardware.

Build Quality	★★★★☆
Performance	★★★★☆
Value for Money	★★★★★
Overall Rating	★★★★☆

p210 ➢

Editor's Choice

Personal Computer World Editor's Choice

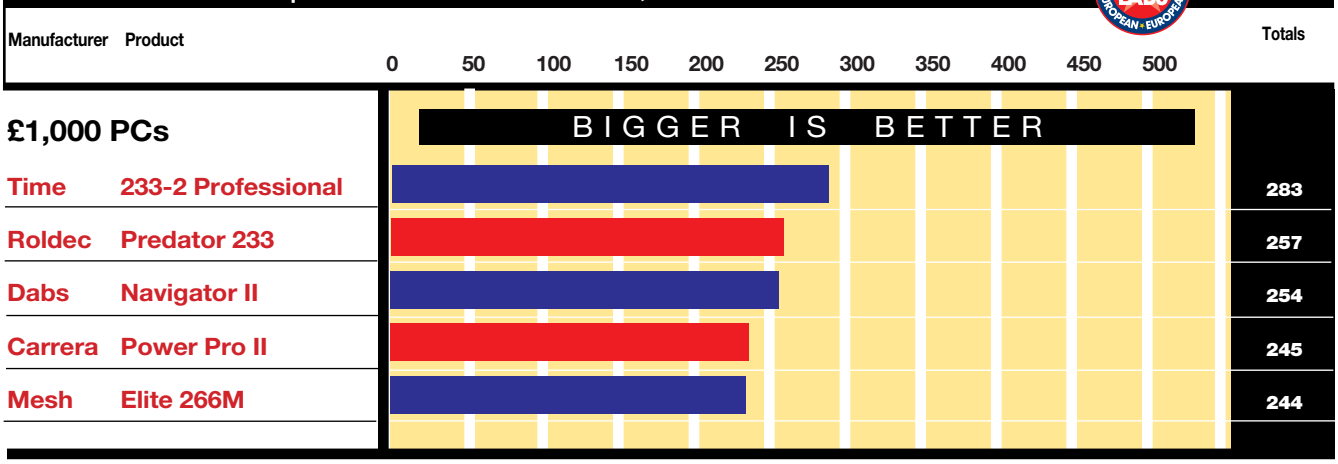
The five PCs in this group test shared similarities in technical specification that made it tricky at times to tell them apart. We had set certain minimum specifications as guidelines, but it was interesting that all the machines apart from one had 64Mb of SDRAM, all five had PII processors with four running at 233MHz, all but one had ATI AGP graphics and three of the five had Creative Labs' AWE64 card.

Roldec sent its Predator 233 for review, and on paper its 32Mb of SDRAM didn't look promising next to the other four machines with double that. In fact, it performed pretty well in the BapCo tests and gained the best score on the Quake frame-rate test. The PC that did best in both tests was the **Mesh Elite 266XM PC**, which gets a well deserved **Highly Commended** award. It was the only PC fitted with a PII 266 rather than the 233 and contained 64Mb SDRAM, a SoundBlaster AWE64 sound card and a US Robotics 56K X2 modem, as well as being one of only two machines to be fitted with a massive 6.4Gb IBM hard drive. As an extra incentive, the accompanying monitor was the excellent 15in Taxan Ergovision.

Our Editor's Choice is never given solely on an impressive set of specifications, however. We take into consideration the package as a whole — which is why **Time Computer Systems** has been awarded the **Editor's Choice** for its **233-2 Professional PC 15"**. We liked the general sense of care that Time seemed to have taken, reflected in the customising of the Windows 95 boot system. There was the VHS "trainer" video too, and the excellent support pack which held all the drivers and manuals together in the relevant sections rather than loose in a box. This machine is more expensive than the price we specified (£82 inc VAT, in fact) and as such we were not surprised to find something extra for the money. Time produced a PC as powerful as the others submitted and the bundled software was impressive: pre-loaded Pressworks and other software, as well as a pack of five games and a ten-CD edutainment pack.

BapCo test results for £1,000 PCs

VNU LABS



Final Reality scores for £1,000 PCs*

VNU LABS

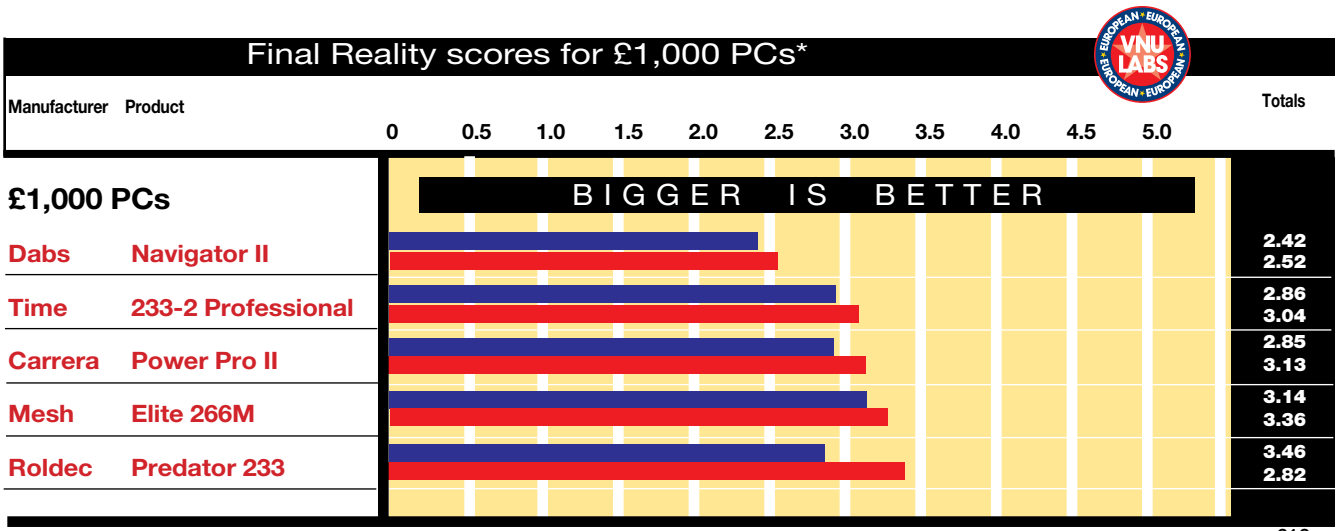


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Table of Features

Personal Computer World Highly Commended

Personal Computer World Editor's Choice





Manufacturer	Carrera	Dabs Direct	Mesh	Roldec	Time Computer Systems
Model	**Carrera Power Pro II**	**Navigator II**	**Elite 266XM**	**Predator 233**	**233-2 Professional PC 15"**
Price (inc VAT)	£1,173	£1,173	£1,173	£1,173	£1,255
Price (ex VAT)	£999	£999	£999	£999	£1,068
Telephone	0171 830 0486	01942 794000	0181 452 1111	01902 456464	0800 771107
Fax	0171 299 6600	01942 790790	0181 208 4933	01902 452592	01282 770701
URL	www.carrera.co.uk	www.dabs.com	www.meshplc.co.uk	www.rodec.com	n/a
Standard warranty	1 yr RTB, 2 yrs lab	1 yr on-site, 4 yrs lab	2 yrs RTB	1 yr RTB, 4 yrs lab	1 yr RTB
Warranty options	Upgrade to 3 yrs on-site	Upgrade to 5 yrs on-site	Upgrade to on-site	1-3 yr s on-site	3 yr/5 yr upgrade
Technical support tel. no.	Not available	01942 794230	0181 208 2028	01902 451551	01282 770033
Hardware spec					
Processor	Intel PII 233 MMX	Intel PII 233 MMX	Intel PII 266 MMX	Intel PII 233 MMX	Intel PII 233 MMX
RAM	64Mb	64Mb	64Mb	32Mb	64Mb
RAM type	SDRAM	SDRAM	SDRAM	SDRAM	SDRAM
Hard disk	Quantum Fireball	Quantum Fireball	IBM	Quantum Fireball Stratus	Seagate
Size(Gb)/interface	3.2Gb/UDMA	3.2Gb/UDMA	6.4Gb/UDMA	3.2Gb/UDMA	6.4Gb/UDMA
Motherboard components					
Motherboard manufacturer	Intel	Abit	Asus	Intel	Intel
Motherboard model	440LX	440LX	P2L97A	AL 440LX	AL440 LX
Chipset	Intel 440LX	Intel 440LX	Intel 440LX	Intel 440LX	Intel 440LX
L2 cache	512Kb	512Kb	512Kb	512Kb	512Kb
Expansion and I/O					
Spare bays 3.5in/5.25in	2/2	4/5	1/1	2/1	2/2
PCI slots/ISA slots/shared	4/2/0	4/3/0	4/2/0	4/2/2	2/4/0
USB/serial/parallel/PS2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
Multimedia					
CD-ROM manufacturer	Mitsumi	Mitsumi	Teac	Teac	LG
CD-ROM speed/interface	24x/IDE	24x/IDE	32x/IDE	32x/IDE	24x/IDE
Sound card manufacturer	Carrera	Creative Labs	Creative Labs	Creative Labs	Creative Labs
Sound card model	S3 Vibes 3D	SoundBlaster AWE64	SoundBlaster AWE64	SoundBlaster AWE64	SoundBlaster 16 Vibra (onboard)
Speakers	Altec Lansing ACS90	Typhoon 120W	Contec 50W	Roldec 240W	Quickshot Sound Force 600
Graphics & monitor					
Graphics card	Ati 3D Xpert@Work	Ati Xpert@Work	Ati Xpert@Work (on-board)	STB Velocity AGP	Ati Xpert@Play
Graphics card RAM/Max RAM	4Mb/8Mb/SGRAM	4Mb/8Mb/SGRAM	4Mb/4Mb/SGRAM	4Mb/4Mb/SGRAM	4Mb/4Mb EDO
Monitor model	Goldstar 57i	Belinea 15 80 35	Taxan Ergovision	Adi Provista E40	CTX 1569SE
Monitor size	15in	15in	15in	15in	15in
Max rfsh rate @ 1,024x768(NI)	85Hz	85Hz	85Hz	85Hz	85Hz
Other information					
Modem make	Rockwell	Typhoon	US Robotics	Roldec	Time
Modem speed (Kbps)	56	33.6	56	56	56
Other extras			Microphone		90-minute VHS training video, Quickshot joystick, Softpak 10-CD package, Top 5 game pack, Headset
Software	Lotus SmartSuite97 PC Check Diagnostic	Lotus SmartSuite97 CorelDraw 4.0	Lotus SmartSuite97 IBM Voicetype	Lotus SmartSuite 97 PC Check System	Lotus SmartSuite97 IBM Voicetype Quicken 5.0 Designworks Pressworks Homewise
Year 2000 compliant?	●	●	●	●	●

● yes ○ no

p214 ➢

£1500

With £1,500 to play with you can expect to be able to buy yourself a fairly impressive PC*. More memory, bigger hard disks and larger, higher-resolution monitor are now well within your reach. PCs in this price bracket are typically built around an Intel Pentium II processor and as such will usually incorporate an AGP graphics card to take advantage of this faster graphics-handling technology.

£1,500 is often used as a benchmark price in the *PCW* office. You will notice throughout our anniversary section [p71] that we have looked at what it was possible to buy for that amount throughout the twenty years of *PCW*'s existence, and comparing what you could buy just 12 months ago with the five machines reviewed in this group is a good demonstration of just how quickly the price of new technology is falling.

A £1,500 PC is ideal for demanding office environments. The 17in monitors specified in our requirements make these machines ideal for Windows users. In such GUI environments, multiple applications, as well as small icons and text, need to be displayed simultaneously, and so a viewable diagonal of at least 15.5in makes the display comfortable on the eye. The generous hard drives and memory installations of these machines mean that they should last, with little or no additions, for a good few years to come. The bundled software is often a good indication of what the manufacturers themselves see their machines being used for, and we were pleased to see that many of them had included a wide selection of educational, reference and business applications (mainly drawn from the Microsoft range). Such inclusions make the PC suitable for home and small office use and although the software is not usually top-of-the-range, it should act as a stopgap measure to save customers from having to make further purchases immediately should they not feel the need.

For those who have the money, £1,500 is a sensible price point on which to base a purchase and the five machines reviewed here give an accurate representation of what a good cross-section of the marketplace is likely to supply for that sort of money. It is no longer necessary to break the £2,000 barrier to have a speedy, up-to-date computer on your desktop.

* *Price includes delivery*.

Evesham Micros Vale Platinum PII

Personal Computer World Highly Commended

The Vale Platinum PII is based around the Intel Pentium II 266 processor with 64Mb SDRAM. The attractive bevelled case had two free front-facing 5.25in bays, but removing the blanking plates to put them in use would leave you with an ugly fascia. Using a key as well as the usual screw arrangement gave this unit a degree of security while inside were hidden a further two free 3.5in bays and a fairly tidy arrangement of cabling that flexed sufficiently to allow easy access to the single remaining free memory slot. The processor was tucked away behind the PSU which would have to be removed to make it accessible.

Two PS/2, two 9-pin COM, two USB and one parallel port were well labelled on the rear of the machine, while inside three PCI and a shared slot were left free for future expansion. A rather cheap-feeling and unresponsive joystick was the only disappointing peripheral, as the Microsoft Intellimouse and Vale-branded KeyTronic keyboard were both a joy to use. The stylish Zydec Zy-Fi speakers with a maximum output of 120W provided excellent sound from the SoundBlaster AWE 64 and looked good enough to sit proudly on any desk.

A wide selection of bundled Microsoft software included Works, Encarta 98 and Money 97 as well as some of the more fun titles along the lines of Cinemania 97 and Golf. SuperVoice software was thrown in to support the 56K internal voice modem. The ATI Rage Pro graphics card held 8Mb onboard RAM to display smooth full-screen video, but we would have liked Evesham to have installed the MSCDEX drivers so that we could use the CD-ROM drive under DOS.

The Taxan ErgoVision 760 monitor offered a clear, sharp display. Extensive on-screen controls allowed for a wide range of adjustments to be made, including simultaneous horizontal and vertical size alterations with its zoom function. The simple push-and-twist-control was intuitive and easy to use. A 15.5in viewable diagonal with .27mm dot pitch makes it particularly suitable for Windows applications where many icons or programs need to be displayed simultaneously.

PCW Details

Price £1,702.58 (£1,449 ex VAT)
Contact Evesham Micros 0800 6345999 www.evesham.co.uk
Good Points Speakers. Monitor. Case.
Bad Points Joystick.
Conclusion A well-built machine that was a joy to use.

Build Quality	★★★★☆
Performance	★★★★★
Value for Money	★★★★☆
Overall Rating	★★★★☆

p218 ➢

Hi-Grade Axion Pv2-266

As with the other machines in this price bracket, the Axion is based around an Intel Pentium II 266 processor and 64Mb SDRAM. We were impressed by the immaculate interior of this PC. All spare power cabling and drive-bay supports had been cable-tied to the base of the case, ensuring that while out of the way they were always to hand: a nice touch. Access to the processor and two free 168-pin memory slots was easy and unobstructed, with the full 64Mb being supplied on a single module. Three free PCI and a shared ISA slot offered reasonable opportunity for expansion and a lot of ventilation. There were three fans in total, including the one on the processor, meaning there was no chance of this machine overheating. One free unoccupied external 3.5in bay and two 5.25in bays would allow us to increase our drive allocation, but with a 120Mb SuperDisk drive and complementary disk thrown in we felt this PC was already looking towards the future. A faulty cable rendered the supplied Cherry keyboard inoperative.

The 56K Pace modem was supplemented by trial software for both BT's LineOne and Hi-Net. Lotus SmartSuite97 was pre-installed and accompanied by World Book and IBM ViaVoice but with no microphone supplied we were unable to test this latter package. The 200W 3D speakers from Jazz Hipster Corporation were satisfyingly loud at just 25 percent of their potential maximum volume, but at anything above that level they started to distort. Comprising a large woofer and two smaller satellite speakers they were suitable for games and entertainment use, but with no CD audio cable fitted to the system — a surprising omission — we were unable to play our music through them.

Driven by an ASUS AGP V-3000 card with 4Mb RAM, the Hi-Grade AlphaScan 711 offered a clear image throughout our tests. The on-screen controls were tricky to use but they offered a range of functions including degauss and, rather than implementing them through separate rotary controls, contrast and brightness. Picture rotation adjustments were available but no colour temperatures controls were present.

PCW Details

Price £1,756.62 (£1,495 ex VAT)
Contact Hi-Grade 0181 532 6110 www.higrade.com
Good Points Monitor. SuperDisk.
Bad Points Faulty keyboard. Poor speakers.
Conclusion A well-built, impressive performer.

Build Quality	★★★★☆
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★☆

KT Computers Vision PII266 AGP

Personal Computer World Editor's Choice

The Vision PII 266 AGP, as the name suggests, uses the Intel Pentium II 266 processor. Upon opening this wide case it at first seemed that we would have difficulty accessing the processor and memory due to a further set of partial walls and the fact that the processor was positioned behind the PSU. Closer inspection revealed that the back of the case slid out, taking the motherboard, memory and processor with it, but the cables linking it to the sound card, drives and fascia LEDs would have to be detached before it would move far enough to be of any use: not to be recommended unless you know what you are doing. There were two external 5.25in bays free.

Direct access to the three free PCI and one free shared slots was fine, and although the 64Mb RAM was installed in the form of two 32Mb modules we still had one slot free to upgrade in the future. Lotus SmartSuite97 was bundled, as was a BT Internet CD and SuperVoice to accompany the modem. Sound arrived courtesy of the excellent SoundBlaster AWE 64 card and a pair of anonymous speakers capable of a maximum output of 120W. At 6.4Gb the Quantum Fireball hard drive was big enough and fast enough to cope with whatever the next generation of software users might want to throw at it. The keyboard and mouse were both comfortable models from KeyTronic and Microsoft respectively but the CD-ROM drive had not been set up to work from DOS.

The attractive Sony MultiScan 200ES monitor, driven by a Diamond Fire GL1000 Pro graphics card with 8Mb RAM, provided a sharp and steady picture throughout our tests. The display was comfortable to look at and the front-mounted buttons, each of which initiated its own mini-set of on-screen controls rather than drawing from a main menu, offered fast access to many commonly used functions. The 16in viewable diagonal of this Trinitron screen had a maximum flicker-free 1,024 x 768 refresh rate of 85Hz with steady colour purity and brightness levels and a constant screen-wide focus.

PCW Details

Price £1,620.33 (£1,379 ex VAT)
Contact KT Computers 0181 961 8897 www.ktcomputers.co.uk
Good Points Monitor. Speed.
Bad Points Tricky to get at the insides.
Conclusion Well built and well worth considering.

Build Quality	★★★★☆
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★☆

Simply Computers Multimedia 7570

The first thing that struck us about this PC was the unconventional bulging case that housed a Zip drive and the usual selection of drives while leaving a further 5.25in external bay free. The only free 3.5in bay was internal, and expansion opportunities comprised two free ISA and one free PCI slots. The back of the machine was well labelled and sported two USB sockets.

Unlike the other manufacturers' offerings, upon arrival some of the 7570's Windows parameters had not been completely set up and we were required to enter our regional settings and OEM number and to install a printer. The keyboard was supplied by Mitsumi with Microsoft providing the mouse. The selection of software was suited to a wide range of users, incorporating, among others, business titles along the lines of WordPerfect Suite 7 and CorelDraw 4 and a selection of games including Descent 2 and Shattered Street.

Sound arrived courtesy of a set of Yamaha 10W-per-channel speakers driven by the excellent SoundBlaster Awe 64 card, while an ASUS graphics card with 4Mb onboard memory took care of video. The interior of the machine was fairly tidy with the CD audio cable neatly tied back to the case, and although there were a number of cables directly in front of the two free SDRAM memory slots they were flexible enough not to impede access. An external 56Kbps Sportster MessagePlus modem and a 32X CD-ROM drive completed the package which was, all in all, an impressive submission from Simply.

The Iiyama VisionMaster Pro 17 monitor supplied the fine, sharp image we have come to expect from this model. The on-screen controls were easy to navigate using just three control buttons, while the 16in viewable diagonal made it particularly suitable for the Windows environment. A sturdy, excellent performer.

PCW Details

Price £1,761.33 (£1,499 ex VAT)
Contact Simply Computers 0181 498 2140 www.simply.co.uk
Good Points Great monitor and software bundle.
Bad Points None to speak of.
Conclusion Hard to beat and well thought out.

Build Quality	★★★★★
Performance	★★★★★
Value for Money	★★★★☆
Overall Rating	★★★★★

Viglen Ultimate PC266W

Personal Computer World Highly Commended

An attractive, spacious tower housed a particularly tidy PC strung together with impressively well-organised cabling: the CD audio cable even passed behind the motherboard. The 4.1Gb hard drive complemented 64Mb of memory that took up just one of the memory slots, leaving a further two free for future expansion, both of which, like the processor, were unobstructed for easy access. Four PCI slots offered excellent potential for expansion, in part because the 8Mb ATI Xpert@work graphics card, like all the others in this test, used the AGP interface, but this did mean there were no spare ISA slots. An external drive bay of each size and an internal 3.5in bay allowed us to add further drives at a later date should we need to increase our storage capacity.

Bundled with an impressive array of software including Works, Encarta 97, educational packages and a variety of games, the Ultimate also included the superb Microsoft SideWinder 3D Pro joystick that kept the child in us happy. A microphone and very extensive documentation made us feel that a lot of thought had gone into the packaging of this PC and the mouse was a top-of-the-range Microsoft Intellipoint model. Both connected using PS/2 adapters, leaving the two 9-pin serial ports free, as well as a pair of USB sockets. All ports were clearly labelled making the Viglen Ultimate a doddle to set up. The monitor's speakers were supplemented by a splendid set of Yamaha powered speakers comprising a 15W subwoofer and two attractive 5W satellites on angled stands. The modem, built around 56K technology, was bang up to date as was the 24-speed Sony CD-ROM drive.

The Viglen-branded monitor incorporated integral speakers that were made redundant by the excellent three-piece Yamaha speaker system. Fascia-mounted controls offered direct access to degauss, volume control, contrast and brightness, whilst the on-screen controls, which included three pre-set colour temperatures, allowed for value adjustments to be made using a rotary wheel. The picture

PCW Details

Price £1,673.20 (£1,424 ex VAT)
Contact Viglen 0990 944 944 www.viglen.co.uk
Good Points Documentation, performance, monitor.
Bad Points Only the monitor speakers, which you would not use anyway.
Conclusion A great performance from a well-built machine.

Build Quality	★★★★★
Performance	★★★★★
Value for Money	★★★★☆
Overall Rating	★★★★☆

p221 ➢

Editor's Choice

With such a range of similar machines at this price point, choosing who should be awarded Editor's Choice was never going to be an easy task. All scored well in terms of build quality, all packed their cases so tightly that they turned out to be good value for money, and all received a very high overall score.

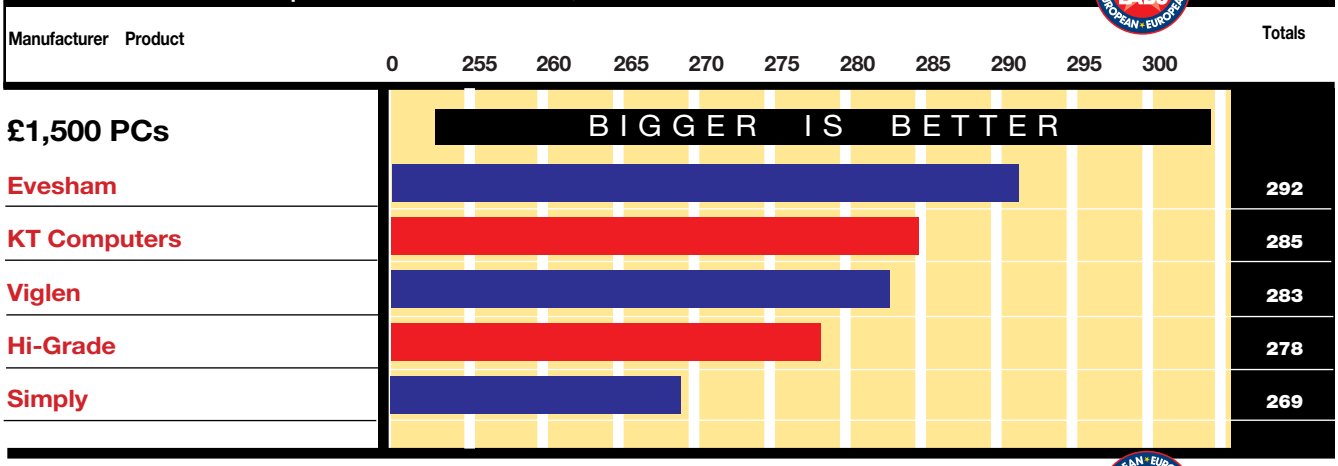
Even the VNU Labs Final Reality Benchmark had difficulty in telling these machines apart. Equipped with powerful graphics cards, they all coped admirably with the 3D rendering necessary to compete in this unforgiving gaming arena.

When spending this type of money you come to expect an impressive monitor and we were certainly pleased to see all the manufacturers coming up with the goods. We particularly liked the Iiyama Vision Master Pro 17 supplied with the Simply Computers system, which offered a clear, sharp, bright image. That same PC also incorporated both a 32-speed CD-ROM and a 56K modem. Current technology means neither of these might ever attain their maximum potential speed, but they will add to the overall speed of the machine by not holding other components back.

The KT PC performed admirably. Its BapCo score was second only to Evesham, which nosed ahead by seven points in front of its rivals. KT's PC had a sturdy feel and we were impressed by the monitor, keyboard and mouse, all of which lent an air of quality. Also, by undercutting all of its competitors by up to £120 it represented excellent value for money, while the five-year warranty proved that this eleven-year-old company is committed to its products. Although coming last in the Final Reality tests there was hardly anything between KT and the leader, with Simply winning by just tenths of a frame per second. It is for these reasons that **KT Computers' Vision PII266 AGP** is awarded our **Editor's Choice**.

The **Viglen Ultimate PC266W** and the **Evesham Micros Vale Platinum PII** both take well deserved **Highly Commended** awards. Built with quality components throughout, they each attained a top score in one of our benchmarks — BapCo for the Evesham and Final Reality for the Viglen, in which the higher the score, the better the 3D-rendering capabilities of the machine in question.

BapCo results for £1,500 PCs



Final Reality results for £1,500 PCs*

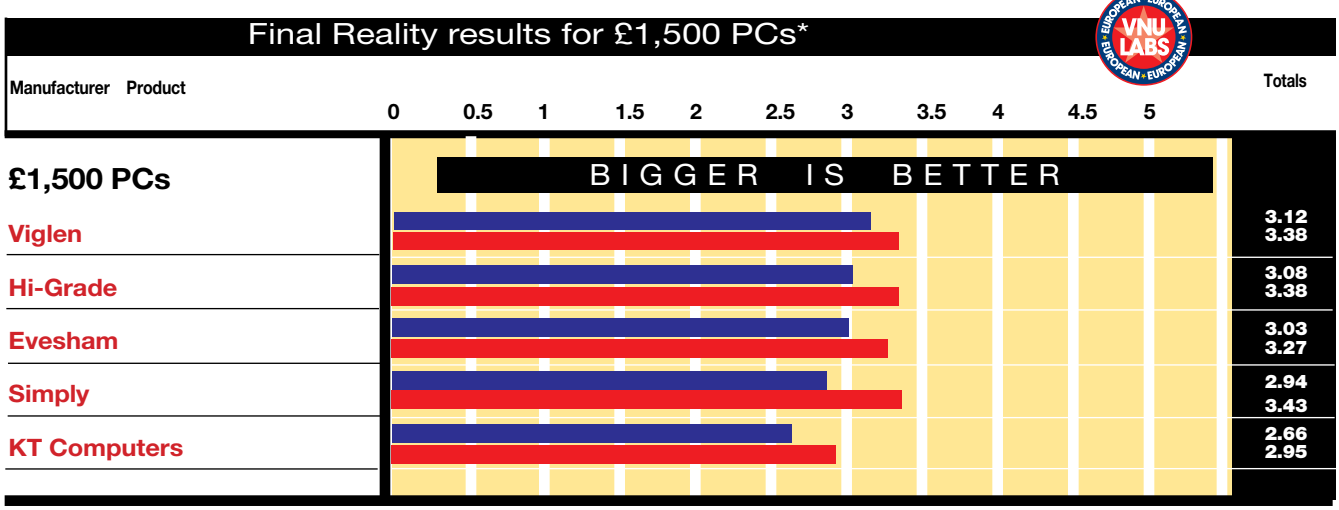


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Table of Features

	Personal Computer World Highly Commended		Personal Computer World Editor's Choice		Personal Computer World Highly Commended
					
Manufacturer	**Evesham Micros**	**Hi-Grade**	**KT Computers**	**Simply Computers**	**Viglen**
Model	**Vale Platinum PII**	**Axion Pv2-266**	**Vision PII 266 AGP**	**Multimedia 7570**	**Ultimate PC 266W**
Price with delivery (inc VAT)	£1,702.58	£1,756.62	£1,620.33	£1,761.33	£1,673.20
Price with delivery (ex VAT)	£1,449	£1,495	£1,379	£1,499	£1,424
Telephone	0800 6345999	0181 532 6110	0181 961 8897	0181 498 2140	0990 944944
Fax	01386 765354	0181 532 6111	0181 961 7498	0181 523 4002	0181 758 7080
URL	www.evesham.co.uk	www.higrade.com	www.ktcomputers.co.uk	www.simply.co.uk	www.viglen.co.uk
Sales hours	9-7 M-F 9-5:30 Sat	9-5:30 M-F	9-6 M-F 10-5 Sat	8-8 M-F 9-5 Sat	9-6 M-F 9-5 Sat 10-2 Sun
Technical support hours	9-5:30 M-F 9-3 Sat	9-7 M-F	As above	8-8 M-F 9-5 Sat	9-5:30 M-F 9-1 Sat
Standard warranty	2 yr OSM	1 yr OSM, 2 yr RTB	1 yr RTB P&L 4 yr Labour	5 yr RTB (2 yr parts & lab)	12 months collect and return
Warranty options	3 yr OSM	N/A	£42 OSM 1st yr	N/A	OSM
Hardware Spec					
Processor	Intel PII 266	Intel PII 266	Intel PII 266	Intel PII 266	Intel PII 266
RAM	64Mb	64Mb	64Mb	64Mb	64Mb
RAM type/pins	SDRAM/168	SDRAM/168	SDRAM/168	SDRAM/168	SDRAM/168
Hard disk	Quantum Fireball SE	Maxtor DiamondMax	Quantum Fireball	IBM Deskstar 5	IBM DHEA 34330
Size(Gb)/acc time(ms)/Int	6.4Gb/9.5ms/UDMA	8Gb/9ms/UDMA	6.4Gb/9.5ms/UDMA	4.3Gb/8.5ms/EIDE	4.3Gb/9.5ms/UDMA
Motherboard components					
Motherboard manufacturer	Chaintech	Asus	Soltek	ABIT	Viglen
Motherboard model	6LTM	P2L-97	66A-C	LX6	VIG6T
Chipset	440LX	440LX	440LX	440LX	440LX
L2 cache	512Kb	512Kb	512Kb	512Kb	512K
Expansion and I/O					
Spare bays 3.5in/5.25in	2x3.5in / 2x5.25in	1x3.5in / 2x5.25in	0x3.5in / 2x5.25in	0x3.5in / 1x5.25in	2x3.5in / 1x5.25in
PCI slots/ISA slots/shrd slots	4PCI / 3ISA / 1shared	4PCI / 1ISA / 1shared	4PCI / 3ISA / 1shared	4PCI / 3ISA / 1shared	4PCI / 1ISA/1shared
USB/serial/parallel/PS2	2USB / 2S / 1P / 2PS2	2USB / 2S / 1P / 2PS2	2USB / 2S / 1P / 2PS2	2USB / 2S / 1P / 2PS2	2USB / 2S / 1P / 2PS2
Multimedia					
CD-ROM manufacturer	Panasonic	Teac	Hitachi	Simply Computers	Sony
CD-ROM speed/interface	24x / IDE	32x / IDE	32x / IDE	32x / IDE	32x / IDE
Sound card manufacturer	Creative Labs	Asus	Creative Labs	Creative Labs	Viglen
Sound card model	AWE 64 Value	PCI-AXP201	AWE64	AWE 64	VIG32 PnP Wave Table
Speakers	ZY-FI Pro	Jazz J-908ST	120W unbranded	Yamaha YST-M20	Yamaha M25
Graphics & Monitor					
Graphics card	Ati 3D RagePro AGP	Asus AGP-V3000	Diamond Fire GL1000	ASUS Riva Chipset AGP	ATI Xpert@work AGP
Graphics card RAM	8Mb	4Mb	8Mb	4Mb	8Mb
Monitor model	Taxan	Sampo/HiGrade KM-711	Sony 200SE Trinitron	Iiyama VisionMaster Pro	17DS
Monitor size (inches)	17in	17in	17in	17in	17in
Max rfsh rate @ 1,024 x 768 (NI)	86Hz	90Hz	85Hz	107Hz	85Hz
Other Information					
Modem make	Vale	Pace Microlin	Modular Technology	3Com Sportster Message+	Viglen CIS
Modem speed (Kbps)	56K	56K	56K	56K	56K
Other extras	Joystick	LS-120 Drive	Iomega Zip	Iomega Zip	Microsoft Intellimouse Joystick
Software	Windows 95 Media 98	Windows 95 Lotus SmartSuite 97 IBM Worldbook CD IBM ViaVoice	Windows 95 Lotus SmartSuite 97 SuperVoice BT Internet Software	Windows 95 Rescue Me Norton Antivirus WordPerfect Suite 7	Windows 95 Works 95 MS CD Titles MMX Enhanced CDs
Year 2000 compliant?	●	●	●	●	●

● yes ○ no

p227 ➢

£2000

Let's face it, £2,000 is a lot of money*. But just think for a minute about what you're buying. A bigger monitor that is kinder on the eyes, more components — and top-of-the-range stuff at that. Buying top-of-the-range is the only way of future-proofing your computer. And that just might mean your PC could last well into the next millennium, without being rendered obsolete by developments in software and peripheral technologies. We asked manufacturers to send us PCs based around a 300MHz processor with 64Mb of RAM, a minimum 6Gb hard drive and a 17in monitor.

Who needs the power these PCs offer? The serious gamer, for one, who may also want something decent on which to run the kids' education CD-ROMs and work out the home accounts on. A seriously fast CPU will be required. Then there's the business manager, wanting something that will just whizz through all those spreadsheets and graphs.

And don't forget other professionals, like graphics animators and 3D modellers who need the raw speed that these top-rated computers offer. Their time is valuable, and the last thing their companies need is for them to be sitting around while a low-powered PC plods through calculations. So, if you need the sort of machine that doesn't keep you hanging around, there should be something that suit your needs.

Oddly, a number of the PCs we received were priced at under £2,000. The extra money could be used to upgrade the odd component or two. Gateway 2000 submitted a machine that was more than £500 under the specified price. It is worth bearing in mind that for the extra money you could get Gateway to upgrade the hard drive to 8Gb and the monitor to a 19in model, and include a Zip drive, joystick, games bundle, and an extra Microsoft software bundle.

** Prices do not include delivery.*

● *Please note that the figures printed on the BapCo graph, page 235, are wrong. A new graph appears in ChipChat, page 746. Please also note that on the Final Reality graph, page 235, the blue bar refers to overall performance and the red bar refers to 3D performance.*

Dan Ultimate+ 2DG

Personal Computer World Editor's Choice

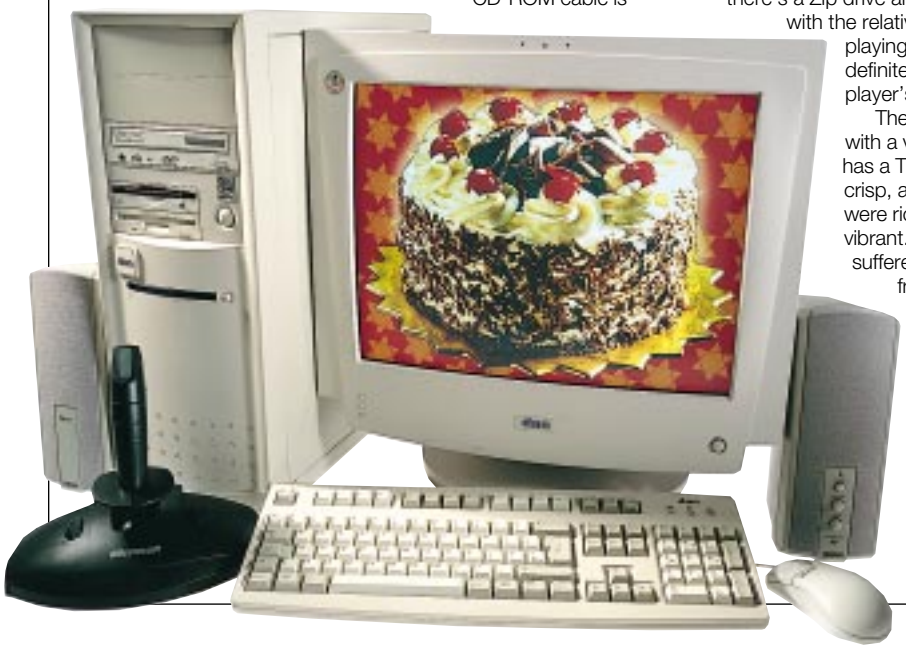
The Ultimate+ 2DG differed from the rest of the pack in that it came with a DVD-ROM drive. Dan has teamed this up with a MPEG card and a Win TV PCI card, so you can impress your friends by hooking the PC up to a TV and watching DVD movies.

All these extra cards crowd the interior of this machine. Getting inside is easy: a couple of screws and the side panel just slides off. To use the only free PCI slot you have to move the modem back, as it uses the shared blanking plate. We were pleasantly surprised to find the excellent AWE 64 Gold sound card installed. As a nice touch, the CD-ROM cable is threaded under the motherboard so it doesn't obstruct access to anything.

The user manual is worth mentioning, as Dan had gone to a lot of effort here. It includes everything you're likely to need to know, such as MS-DOS and troubleshooting Windows 95.

The Ultimate+ featured bundled software including Microsoft Works, Quicken 6 and a number of games including Wing Commander IV DVD. Dan also packed in some extra hardware: there's a Zip drive and a PC camera (terrific for video-conferencing with the relatives in Australia). And, to really give you that game-playing edge, a Sidewinder joystick is included. This is definitely a machine that would be happier in a game-player's living room than sitting sedately in an office.

The monitor was an excellent 19in ADI Microscan 6P, with a viewable area of 18in and a USB hub at the rear. It has a TCO 95 rating and is VESA compliant. Focus was crisp, and colours were rich and vibrant. While it suffered a little from moiré, the on-screen controls include an adjustment for this.



PCW Details

Price £2,350 (£2,000 ex VAT)
Contact Dan 0181 830 1100
www.dan.co.uk
Good Points Monitor. Build quality. DVD-ROM. Win TV card. Sound card. Extra hardware.
Bad Points None to mention.
Conclusion An excellent powerhouse PC.

Build Quality	★★★★½
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★★

p228 ➢

Dell Dimension XPS D300

Personal Computer World Highly Commended

The Dimension XPS D300 looked professional, with its 19in monitor and its tall, skinny casing cut with industrial-strength vents. The only splash of colour on the front of the system is the baby-blue Dell badge.

For storage purposes there's a Zip drive, and Dell has included three additional Zip cartridges in the box. Installation is aided by an excellently laid out A3-sized setup guide. Lifting the lid revealed a spacious interior with slightly messy cabling, but as long as the cables aren't too loose or obstructing access to anything, this is not a big problem. The innards are dominated by the huge gold heatsink on the Pentium II processor. Two of the three DIMM slots are occupied by 64Mb of SDRAM.

The Matrox Millennium II AGP card comes with 8Mb of WRAM and should prove more than adequate for most business purposes. This left all four of the PCI slots empty. Both of the ISA slots are occupied, by the AWE 64 sound card and the 33.6 modem.

The hard drive is tucked neatly down the side of the case, towards the front in a vertical position. Further expansion is catered for by one internal 3.5in bay, an external 3.5in bay and an external 5.25in bay.

The Dell was one of two machines to come with Internet Explorer 4.0 preloaded (the other being the Gateway). The rest of the bundle included Microsoft Office Small Business Edition and McAfee Virus Scan. We liked the Program Diskettes application that loads on the initial start-up and works as a handy reminder to back your system up.

We were impressed by the Dell D1226H 19in monitor. It has 17.9in viewable area and is VESA DDC1/2B and TCO 95 compliant. There's room for a USB hub to be installed at the rear but no ports had been fitted. Initially it suffered badly from moiré, but the on-screen controls included a moiré adjustment as well as colour

PCW Details

Price £2,172.58 (£1,849 ex VAT)
Contact Dell 01344 724699
www.dell.co.uk
Good Points Monitor. Zip drive.
Bad Points Not the best performer of the bunch.
Conclusion A solid, business-like PC.

Build Quality	★★★★☆
Performance	★★☆☆☆
Value for Money	★★★★☆
Overall Rating	★★★★☆

Elonex PTX-6300/I

The PTX-6300/I comes in a standard case design that is rather stiff and difficult to remove. But perseverance pays, as the interior of this machine is worth making the effort for, being especially neat and tidy. Thoughtfully, Elonex has clipped power cables to the sides of the empty bays so that they're ready to plug in to any additional devices you might want to fit at a later date.

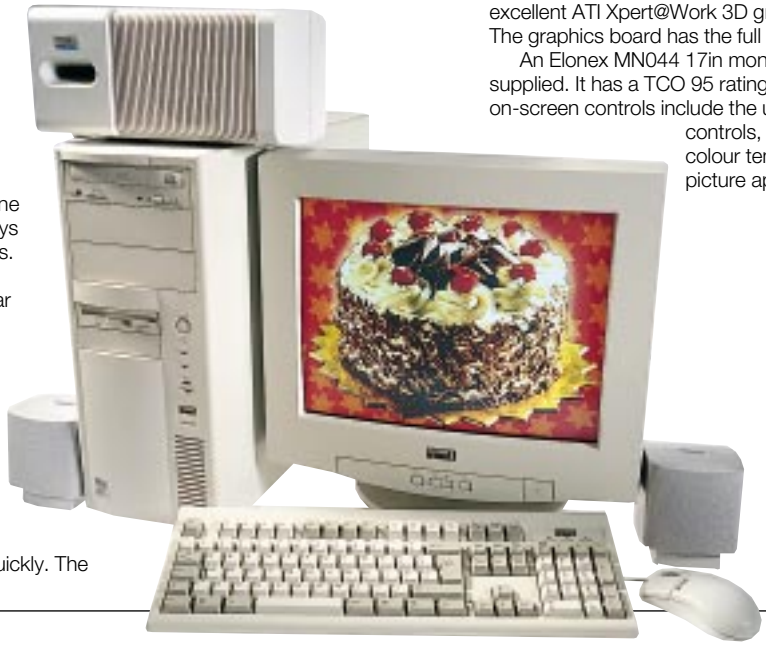
Indeed, you may want to add a secondary storage device in there, as this PC doesn't come with one. This will initially only be necessary for backup purposes, as it will take a while to fill up the 9Gb Seagate hard drive. There are two vacant forward-facing 5.25in bays, with external access. One of the two 3.5in bays has external access.

Overall, this computer seems far more suited to the needs of a small business, perhaps one that is looking for a PC to run its spreadsheets and so forth at speed, and won't become outdated terribly quickly. The bundled software includes Microsoft Office Small Business edition and there was a microphone with headset in the box.

Initially the video card wasn't sending anything to the monitor, but it may have come loose in transit as a little jiggling about soon put matters right. Even the most well-built PC can come unstuck with a bit of rough handling.

Sound is onboard, provided by a Yamaha OPL3-SA chipset, leaving one of the two ISA slots empty. The other ISA slot is occupied by the K56flex modem. All four of the PCI slots are vacant, with the excellent ATI Xpert@Work 3D graphics card fitted into the AGP slot. The graphics board has the full 8Mb of SGRAM fitted.

An Elonex MN044 17in monitor with 15.9in viewable area was supplied. It has a TCO 95 rating and is VESA DDC1/2B compliant. The on-screen controls include the usual size, positioning and geometric controls, as well as degaus and adjustments for colour temperature. Focus is crisp, and the picture appeared moiré-free.



PCW Details

Price £2,167.88 (£1,845 ex VAT)
Contact Elonex 0181 452 4444
www.elonex.co.uk
Good Points Tidy insides. Power cables plugged and ready for additional devices. Graphics card.
Bad Points No additional storage device.
Conclusion Most suitable for small-business use.

Build Quality	★★★☆☆
Performance	★★★☆☆
Value for Money	★★☆☆☆
Overall Rating	★★★☆☆

p230 ➢

Gateway G6-300

Gateway has a reputation for building solid, reliable computers and the G6-300 is no exception. In common with Gateway practice, this one came in an ivory, smoothly-contoured case.

While other machines in this group managed to include a few extra devices, Gateway opted instead to stick with the basic specification we asked for, such as the minimum 4Gb hard drive. This is also reflected in the price, which was £550 less than the maximum of £2,000 allowed. However, a microphone with stand was included in the box.

Installation was simple: Gateway colour-codes all the connections on its machines so it is hard to go wrong. A guide to maintaining and troubleshooting your PC is included, which should ease the worries of most users. The software bundle had a few nice surprises, including MS Office Small Business Edition, Internet Explorer 4 and McAfee Virus Scan — a bundle that would be at home in any small office.

Getting inside is fairly easy and reveals a mass of messy cabling that does not, in fact, obstruct access to anything. Of the three DIMM slots, only one is occupied by the 64Mb of SDRAM, leaving two for upgrading the memory. The hard drive is tucked down the side of the case, to the front, with enough room in the bracket for another 3.5in drive to be fitted internally. Further expansion space is afforded by the two vacant forward-facing 5.25in bays with external access.

An Ensoniq sound card is fitted into one of the four PCI slots, leaving the other three free. A US Robotics modem occupies one of the two ISA slots available.

Gateway supplied its own EV700 17in monitor, with 15.9in viewable area, which unfortunately was not the best in the group. It is both MPR II and EPA EnergyStar compliant. The on-screen controls are easy to use and include a degaussing function. Focus is crisp in the centre as well as at the corners of the screen, but even at a refresh rate of 75Hz the screen still appeared a little flickery.

PCW Details

Price £1,702.58 (£1,449 ex VAT)
Contact Gateway 2000; 0800 552000 www.gateway2000.co.uk
Good Points Price. Software.
Bad Points Performance. Monitor. Lacks any additional devices.
Conclusion Spend the extra £500 on a few upgrades, or shop around.

Build Quality	★★☆☆☆
Performance	★★☆☆☆
Value for Money	★★★☆☆
Overall Rating	★★☆☆☆

Panrix Lightning II300

Panrix has hidden away all those unsightly power and reset buttons, as well as the two 5.25in bays and the Zip drive, behind a door on the front of its Lightning II300. This left only the floppy and CD-ROM drives exposed.

Getting inside is very easy. You don't even need a screwdriver — just a couple of twists of the knob at the rear of the case does it. It's very spacious in there, and although the cabling could be neater, it doesn't obstruct access to anything.

After having been switched on for some time, the case did feel a little bit hotter than we'd have liked. As there's a bracket already fitted for an additional fan at the front of the case, it might be a good idea to have one installed.

Both of the ISA slots on the Asus motherboard are occupied, with an AWE 64 sound card and a K56flex modem. In common with most PCs based around a Pentium II, all four of the PCI slots are vacant, with the Diamond Fire GL graphics card fitted into the AGP slot. As the graphics drivers limited us to running the Quake test at a setting of 320 x 200, it was difficult to judge the speed of the graphics accelerator.

The 64Mb of SDRAM has been fitted onto a single module, leaving two of the three DIMM slots vacant for future upgrades. There's also some room for fitting additional devices, with one internal 3.5in bay and two forward-facing 5.25in bays, with external access, vacant. The software bundle includes Lotus SmartSuite.

An excellent 17in Iiyama Vision Master Pro Diamondtron monitor was supplied, with 16in viewable area. As well as the PC-standard D-Sub connector, there are BNC connectors at the rear. It has VESA DDC1/2B and TCO 95 ratings. All the usual size, positioning and geometric controls are available on-screen, along with colour temperature, moiré and degauss.

PCW Details

Price £2,109.13 (£1,795 ex VAT))
Contact Panrix 01132 444 958 www.panrix.com
Good Points Case design. Monitor.
Bad Points The inside of the case got a little hotter than we would have liked.
Conclusion A good machine.

Build Quality	★★★☆☆
Performance	★★★★☆
Value for Money	★★★☆☆
Overall Rating	★★★★☆

p235 ➢

Editor's Choice

We weren't certain, when we drew up the specifications for this group test, whether we'd get a batch of PCs suited to an office or a collection of awesome gaming machines. What we actually got was a bit of a mixed bag. Most of the PCs we saw would be more at home in an office, coming as they did with software like Microsoft Office 97 Small Business Edition and little to entice customers looking for the ultimate games machine.

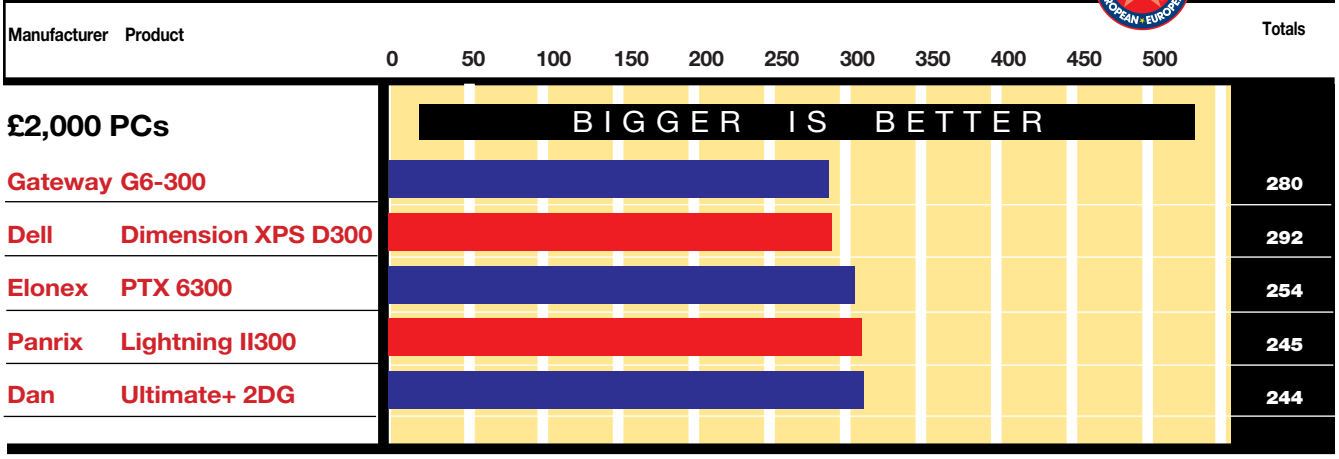
Gateway's warranty included an extra two years return-to-base tacked on to the standard one-year on-site offered by everyone else. This was a bright light in an otherwise dull field — we're sure that most people, and many small companies, would feel more confident with a longer standard warranty. However, there were some lengthy extensions available, the best of which being the five-year warranty option offered by Elonex.

The size of the hard drives installed in these machines was staggering, with 8.4Gb to be found in three machines, and a stonking 9Gb installed in the Elonex. When it came to graphics support, four of the PCs had 8Mb of memory on the graphics card. Only Gateway had the lesser amount of 4Mb on its card, although it did use a respectable STB Velocity 128. Having given a minimum specification and a £2,000 price point, it was rather strange that Gateway opted to send us its £1,500 PC. Four of the machines came with a 56K modem, with only Dell opting for a 33.6Kbps.

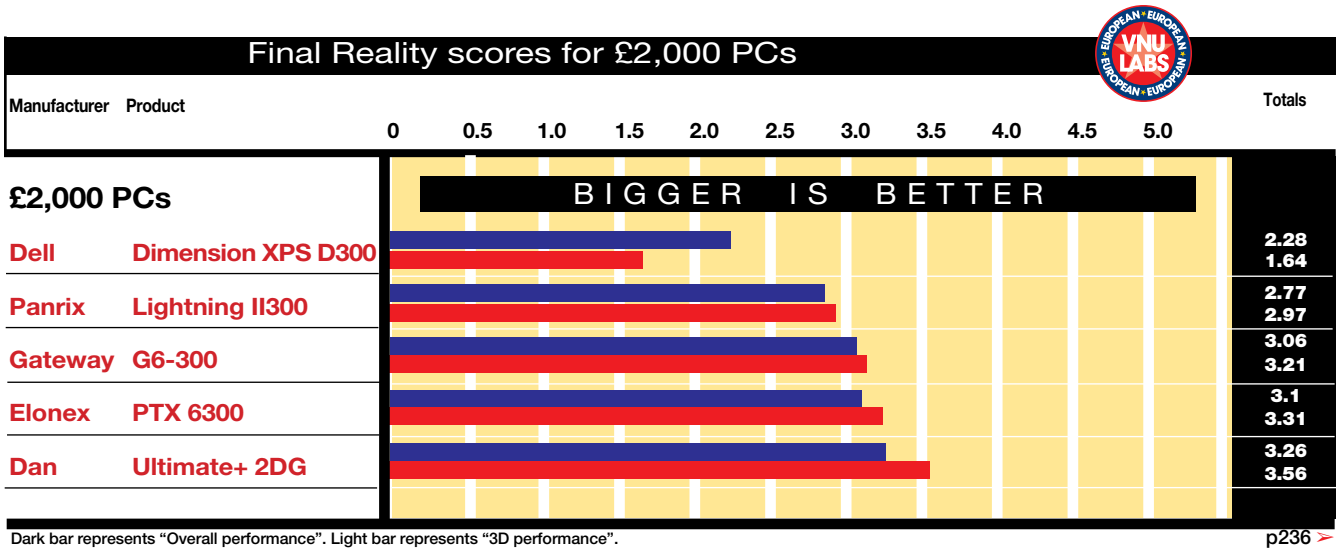
We had a tough time picking a Highly Commended. Although the Panrix Lightning II300 lived up to its name, turning in the second-fastest benchmark, in the end the Dell Dimension XPS D300 had the edge — but only slightly. Both are superbly specified office machines. Where the Dell machine fell down in the performance stakes, it made up for with a gorgeous 19in monitor and a solid, office-orientated software package. Ease of use and installation also counted in its favour.

When it came to picking an Editor's Choice, however, there was no competition. Dan's Ultimate+ 2DG was streets ahead of the rest of the pack. It came in smack on the price-point of £2,000 plus VAT and it was stuffed full of goodies. Best suited to home use, any user looking for a high-performance solution would appreciate this beastie.

BapCo test results for £2,000 PCs



Final Reality scores for £2,000 PCs



Dark bar represents "Overall performance". Light bar represents "3D performance".

p236 ➢

Table of Features

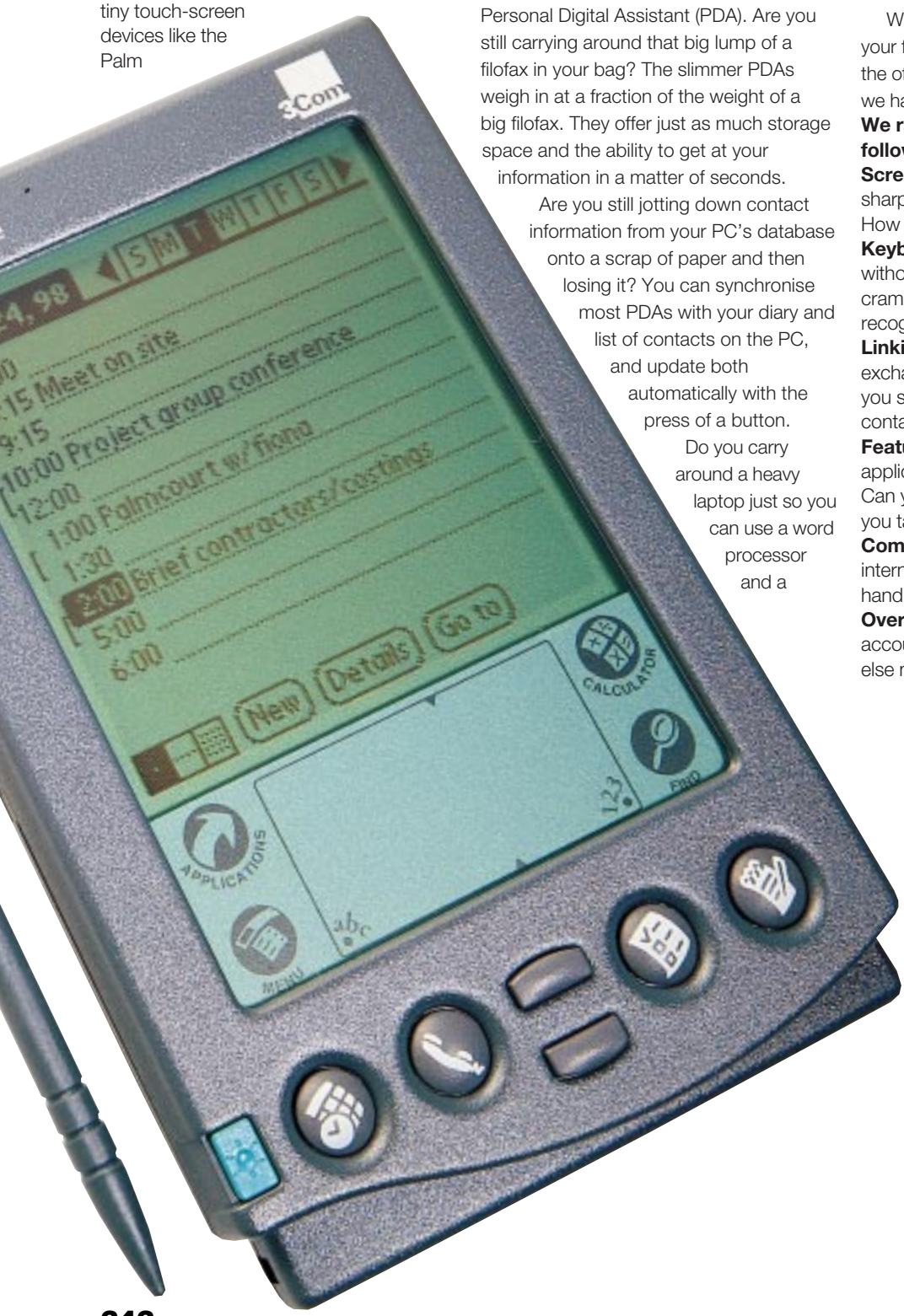
Manufacturer	Dan Technology	Dell	Elonex	Gateway 2000	Panrix
Model Name	**Dan Ultimate+ 2DG**	**Dell XPS D300**	**PTX-6300**	**G6-300 M**	**Lightning II300**
Price (ex VAT)	£2,000	£1,849	£1,845	£1,449	£1,795
Price (inc VAT)	£2,350	£2,172.58	£2,167.88	£1,702.58	£2,109.13
Telephone	0181 830 1100	01344 724699	0181 452 4444	0800 55 2000	01132 444958
Fax	0181 830 1122	01344 860187	0181 452 6422	00353 1 848 2022	01132 444 962
Web address	www.dan.co.uk	www.dell.com	www.elonex.co.uk	www.gateway2000	www.panrix.com
				.co.uk	
Standard warranty	1 yr RTB	1 yr RTB	1 yr on-site	1 yr on-site, 2 yrs RTB	1 yr on-site
Warranty options	On-site	3 yrs on-site	Up to 5 yrs	3 yr on-site	3 yrs on-site
Technical support	M-F 9.30-6	Mon-Fri 8-8	M-F 8-8; Sat 9-1	M-Sat 8-10	M-F 9.30-6; Sat 10-5
Hardware Spec					
Processor	Pentium II - 300MHz	Pentium II - 300MHz	Pentium II - 300MHz	Pentium II - 300MHz	Pentium II - 300MHz
RAM/RAM type	64Mb SDRAM	64Mb SDRAM	64Mb SDRAM	64Mb SDRAM	64Mb SDRAM
Hard disk	IBM	Maxtor DiamondMax	Seagate Medalist Pro	Quantum Fireball ST	IBM DHEA
Size(Gb)/access	8.4GB/11ms	8.4Gb/9.8 ms	9GB/10ms	4.3GB/10ms	8.4GB/10ms
Interface	EIDE EDMA	EIDE UDMA	EIDE UDMA	EIDE UDMA	EIDE UDMA
Motherboard Components					
Motherboard manufacturer	SuperMicro	Intel	Intel	Intel	Asus
Chipset	Intel 440LX	Intel 440LX	Intel 440LX	Intel 440LX	Intel 440LX
L2 cache	512Kb	512Kb	512Kb	512Kb	512Kb
Expansion and I/O					
Spare bays 3.5in /5.25in	1 3.5in/2 5.25in	2 3.5in/1 5.25in	2 3.5in/2 5.25in	1 3.5in/2 5.25in	1 3.5in/2 5.25in
PCI slots/ISA slots/shared slots	4 PCI/3 ISA/1 shared	4 PCI/2 ISA/1 shared	4PCI/2 ISA/1 shared	4PCI/2 ISA/1 shared	4PCI/2 ISA/ 1 shared
USB/serial/parallel/PS2	2USB/2S/1P/2PS/2	2USB/2S/1P/2PS/2	2USB/2S/1P/2PS/2	2USB/2S/1P/2PS/2	2USB/2S/1P/2PS/2
Multimedia					
DVD/CD-ROM manufacturer	Creative Encore DVD	NED CDR-1900	Acer	Mitsumi FX320s	Toshiba/6202B
CD-ROM speed/Interface	20x EIDE	32x EIDE	32x EIDE	32x EIDE	32x EIDE
Sound Card manufacturer	Creative Labs	Creative Labs	Elonex	Ensoniq	Creative Labs
Sound Card model	AWE 64 Gold	AWE 64	OPL3-SAX	Audio PCI	AWE 64
Speakers	Yamaha MIS+ Sub	Altec Lansing ACS 495	Altec Lansing	Boston Acoustics	Yamaha M20
Graphics & Monitor					
Graphics Card/memory	Matrox Millenium II/8Mb	Matrox Millenium II /8Mb	ATI Xpert@Work/8MB	STB Velocity 128/4Mb	Diamond FireGL/8Mb
Bus Type - AGP or PCI	AGP	AGP	AGP	AGP	AGP
Monitor model	ADI 6P	Dell D1226	Elonex MNO44	Gateway EV700	Iiyama MT 9017
Monitor size	19in	19in	17in	17in	17in
Max refresh rate @ 1024x768 (NI)	85Hz	85Hz	75Hz	85Hz	85Hz
Other Information					
Modem speed (Kbps)	K56Flex	33.6	K56Flex	56K x2	K56Flex
Other extras	Iomega Zip	Iomega Zip			Iomega Zip Drive
	Win TV card				
	Joystick, PC camera				
Office suite	Quicken 6.0	Microsoft Office 97 SBE	MS Office SBE	MS Office 97 SBE	Lotus SmartSuite
Other software	Microsoft Works	McAfee Virus		McAffee Virus	
	Page Plus Two DVD games	Microsoft Works		I.E. 4.0	
Year 2000 compliant?	●	●	●	●	●

● yes ○ no

PDAs

You've got to hand it to 'em: the PDAs and palmtops we've got our fingers on here are a useful, highly desirable bunch of little technological marvels.

This group test is the gadget lover's idea of heaven. We have over 20 of the coolest products ever to grace the pages of *PCW*, including tiny touch-screen devices like the Palm Pilot, the latest technicolour Windows CE machines and all-in-one marvels like the Nokia 9000i.



There are many reasons for buying a Personal Digital Assistant (PDA). Are you still carrying around that big lump of a filofax in your bag? The slimmer PDAs weigh in at a fraction of the weight of a big filofax. They offer just as much storage space and the ability to get at your information in a matter of seconds.

Are you still jotting down contact information from your PC's database onto a scrap of paper and then losing it? You can synchronise most PDAs with your diary and list of contacts on the PC, and update both automatically with the press of a button.

Do you carry around a heavy laptop just so you can use a word processor and a spreadsheet on the move? A PDA can relieve the load on your back and on your wallet, and still provide the functionality you need.

Whether you want something to replace your filofax, do word processing away from the office or collect your email on the move, we have solutions to fit everybody's pocket.

We rated each product on the following six categories:

Screen: How big is it? Is it clear and sharp? Does it reflect a lot of light? How good is the backlight?

Keyboard/Input: Are the keys easy to find without looking? Does the keyboard feel cramped? Does the handwriting recognition really work?

Linking with a PC: How easy is it to exchange information with your PC? Can you synchronise data, keeping your diary, contacts, etc. up to date automatically?

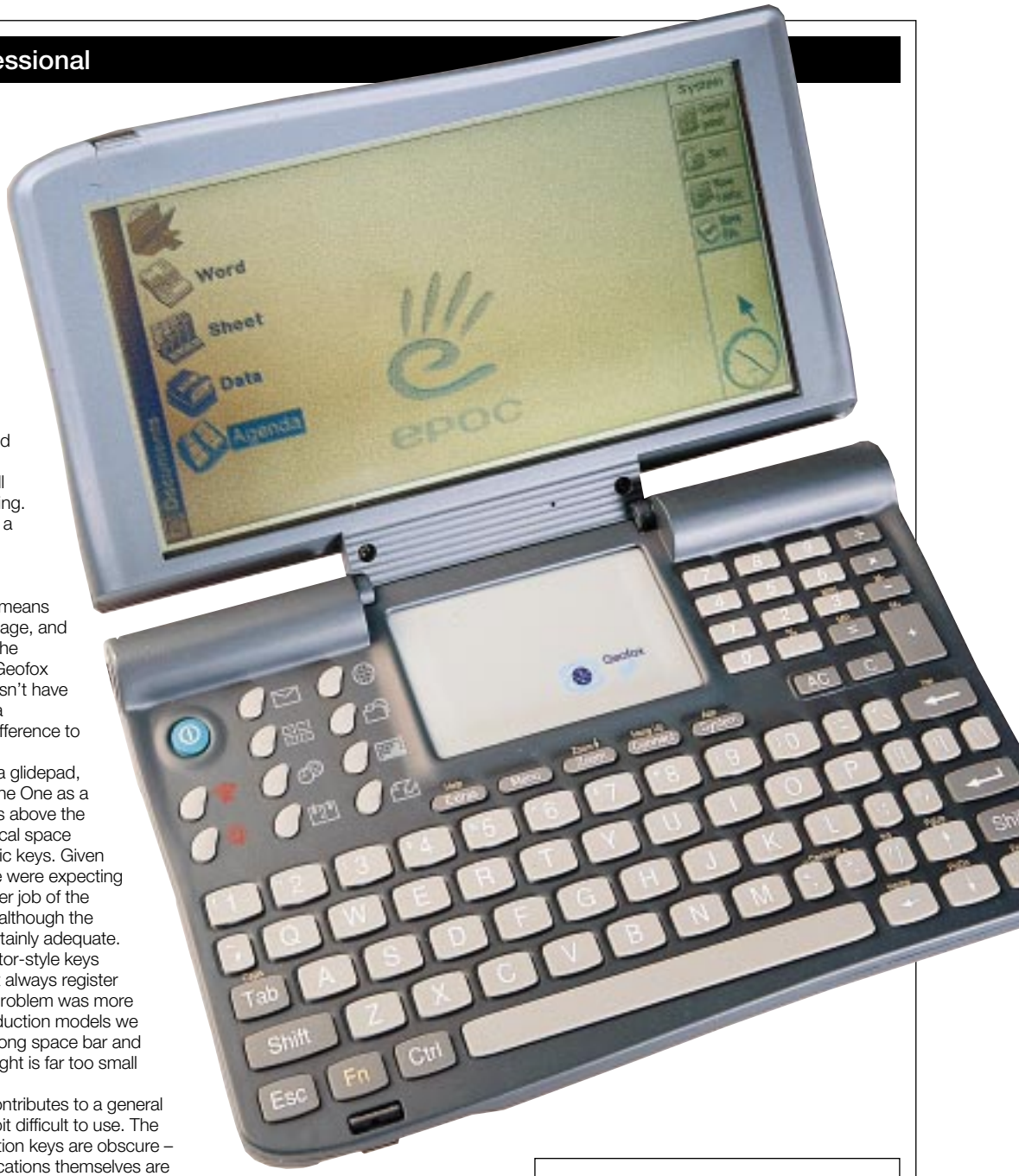
Features: Is there a good range of applications? How much memory is there? Can you connect other devices to it? Can you take audio recordings?

Comms: How easy is it to connect to the internet? Is email a doddle or too hard to handle?

Overall: The overall score, taking into account the above ratings and anything else not covered by those five categories.

PDAs Contents

Geofox One Professional



Rather than develop its own operating system, Cambridge-based start-up Geofox licensed EPOC32 — also seen in the Psion Series 5 — from Psion Software and built a new PDA around that. With this aiding its development, the One went on sale in November last year and is the largest, though also about the thinnest, PDA around. It's definitely baggable rather than pocketable and is aimed at those who don't want the weight of a notebook but still need to do a good bit of typing.

To justify the size there's a massive screen: with a 6.8in diagonal and 640 x 320 resolution it's almost in sub-notebook territory. The size means you can see plenty of your page, and it's nice and clear although the backlight is a little dull. The Geofox One isn't pen-based so doesn't have a touch-screen: the lack of a membrane makes a huge difference to both clarity and reflectivity.

Instead of a pen there's a glidepad, fostering the impression of the One as a shrunken notebook. This sits above the keyboard, reducing the vertical space available for the alphanumeric keys. Given the room in that big case we were expecting Geofox to have made a better job of the keyboard. It feels cramped, although the horizontal key spacing is certainly adequate. Worse, it has rubber calculator-style keys which feel spongy and don't always register key-presses, although this problem was more pronounced on the pre-production models we saw first. We didn't like the long space bar and the numeric keypad at top right is far too small for adult fingers.

The keyboard actually contributes to a general feeling that the Geofox is a bit difficult to use. The hieroglyphics by the application keys are obscure – a shame, because the applications themselves are pretty good.

EPOC 32 is a well-integrated operating system with all the essential functions like a word processor, diary and spreadsheet working tidily together. For general use the integrated software is fine, apart from the absence of a Sort function in Sheet. There are other limitations — no month view or multiple alarms for the same event in Agenda, no outliner in Word and an undocumented 25-field limit in the database — but you can live with these.

Just to make it easier to live with, in fact, the Geofox comes with 8Mb of ROM and 4Mb or 16Mb of RAM. A PC connection cable is in the box together with a copy of PsiWin 2.0, although this has been branded EPOC Connect for the OEM market. As with the Series 5 this supports drag-and-drop conversion between the Geofox and PC applications, though we have found problems like spurious lines being inserted in Word.

Unlike the Psion Series 5 though, EnRoute route-planning software is built in along with the web browser and email client. If you buy the Professional model then you also get a multi-voltage travel mains adaptor together with a modem to fit the single PC Card slot. We had no problems whatsoever setting up the Geofox to use a dial-up account: email is fine, browsing possible but a little slow, and frames aren't supported.

Other software? Well, it will run just about anything written for the Psion Series 5. For a comprehensive list, look at Psion's web site, but there are a huge number of third-party developers. One of the best-known, Palmtop, can be found at www.palmtop.nl where you'll find freeware delights like a Spectrum emulator and a Doom engine. We've tried both and wouldn't be without them.

John Sabine

PCW Details

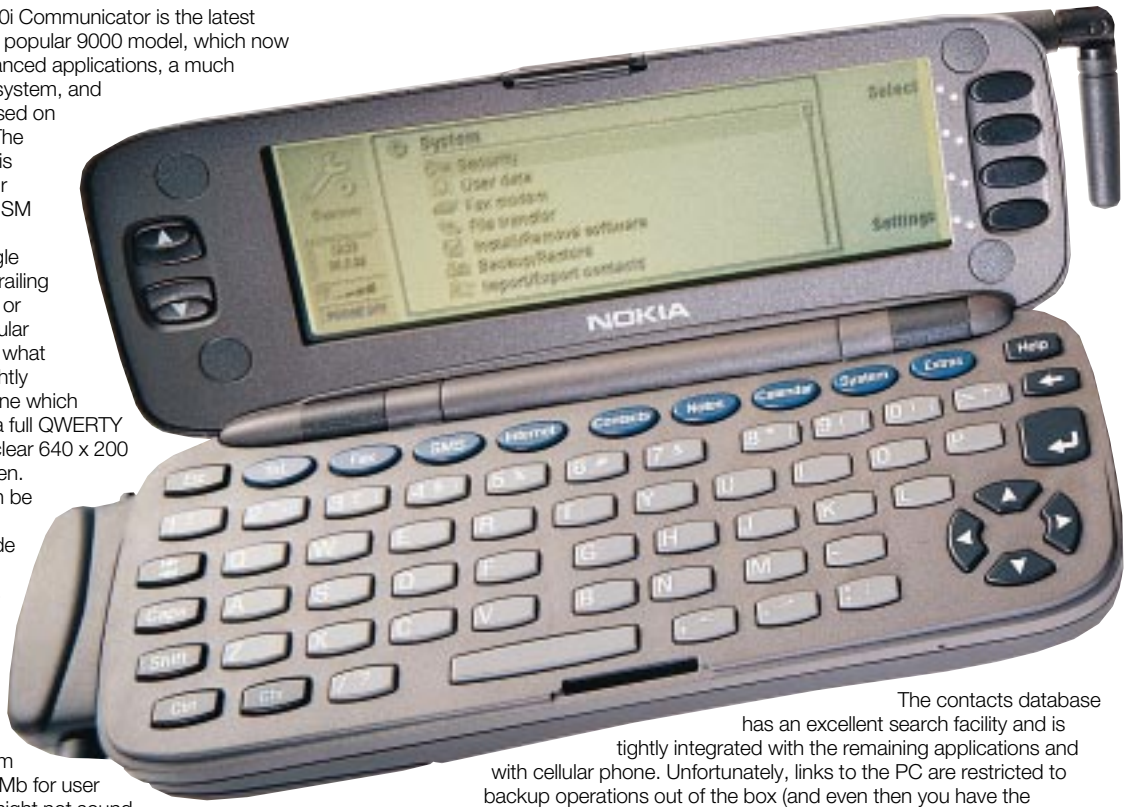
Contact Geofox 0845 844 0109
www.geofox.co.uk
Price Geofox One 4Mb, £385 (£327.66 ex VAT); Geofox One 16Mb, £449 (£382.12 ex VAT); Geofox One Professional 4Mb, £535 (£455.32 ex VAT); Geofox One Professional 16Mb, £599 (£509.79 ex VAT)

Good Points Big, clear screen. Great value.
Bad Points The keyboard, for its combination of spongy feel and poor use of space. PsiWin — sorry, EPOC Connect — is still buggy.
Conclusion A good first effort but a missed opportunity overall. We can't wait to see the Geofox Two…

Screen	★★★★☆
Keyboard	★★☆☆☆
Linking to PC	★★★☆☆
Features	★★★★★
Comms	★★★★☆
Overall	★★★☆☆

p244 ➢

Nokia 9000i Communicator



The Nokia 9000i Communicator is the latest version of the popular 9000 model, which now includes enhanced applications, a much improved calendar system, and internet services based on Smart Messaging. The real advantage of this device is that all your internet, PDA and GSM phone facilities are catered for by a single device — no more trailing wires between PDA or laptop and your cellular phone. The result is what appears to be a slightly oversized GSM phone which opens up to reveal a full QWERTY keypad and a very clear 640 x 200 greyscale LCD screen. The phone can even be used in "hands free speakerphone" mode when the case is open.The 9000i has an Intel 386 processor with 8Mb of memory — 4Mb for the Geos 3.0 operating system and 2Mb for program execution, leaving 2Mb for user data storage. This might not sound like much but it is quite Tardis-like, in that you can fit far more in there than you would think.

The contacts database has an excellent search facility and is tightly integrated with the remaining applications and with cellular phone. Unfortunately, links to the PC are restricted to backup operations out of the box (and even then you have the purchase the serial lead separately). More advanced synchronisation with PC applications is via third-party Intellisync software.

The Communicator includes SMS capabilities but Nokia has extended these to allow "Smart Messages" (which can even configure a Communicator remotely) and long messages (up to 2280 characters).

The Calendar is the product's weakest application but it is adequate, and even allows you to send and receive requests for meetings to other 9000i users via SMS. The Notepad, too, is fairly basic but once your documents are complete, a couple of keypresses are all that is required to send them via SMS, fax or email, or they can be printed out via an infra-red link or transferred to your PC via the serial interface (or infra-red). Faxing using the Communicator is a cinch, and once a fax has been received it can be viewed, zoomed, rotated, printed out or forwarded to another fax machine.

Finally, the internet application provides email, WWW browser, Telnet and Terminal functions. You can have any number of Internet Service Providers and configuration is very straightforward. Both web browser and email facilities are easy to use, the former doing a creditable job of viewing web pages on such a tiny screen, the latter offering full support for both IMAP and POP3.

All in all, the Nokia 9000i is a "go anywhere" piece of kit that does just about everything I could want in a compact and convenient one-piece package. Yes, there are a couple of shortcomings: the keyboard is not brilliant if you have lots of writing to do, the Calendar application is a little too basic for me, and there is no backlight. But all of these can be forgiven given the size of the package, the battery life and the wonderful "all-in-one" approach.

Bob Walder

PCW Details

Contact Nokia 0990 003110

Price £299 (inc VAT & connection)

Good Points Internet, PDA and GSM facilities on one device.

Bad Points Keyboard. No backlight.

Conclusion Excellent "all-in-one" PDA.

Screen	★★★★☆
Keyboard	★★★☆☆
Features	★★★★★
Linking with PC	★☆☆☆☆
Comms	★★★★★
Overall	★★★★★

Case Studies

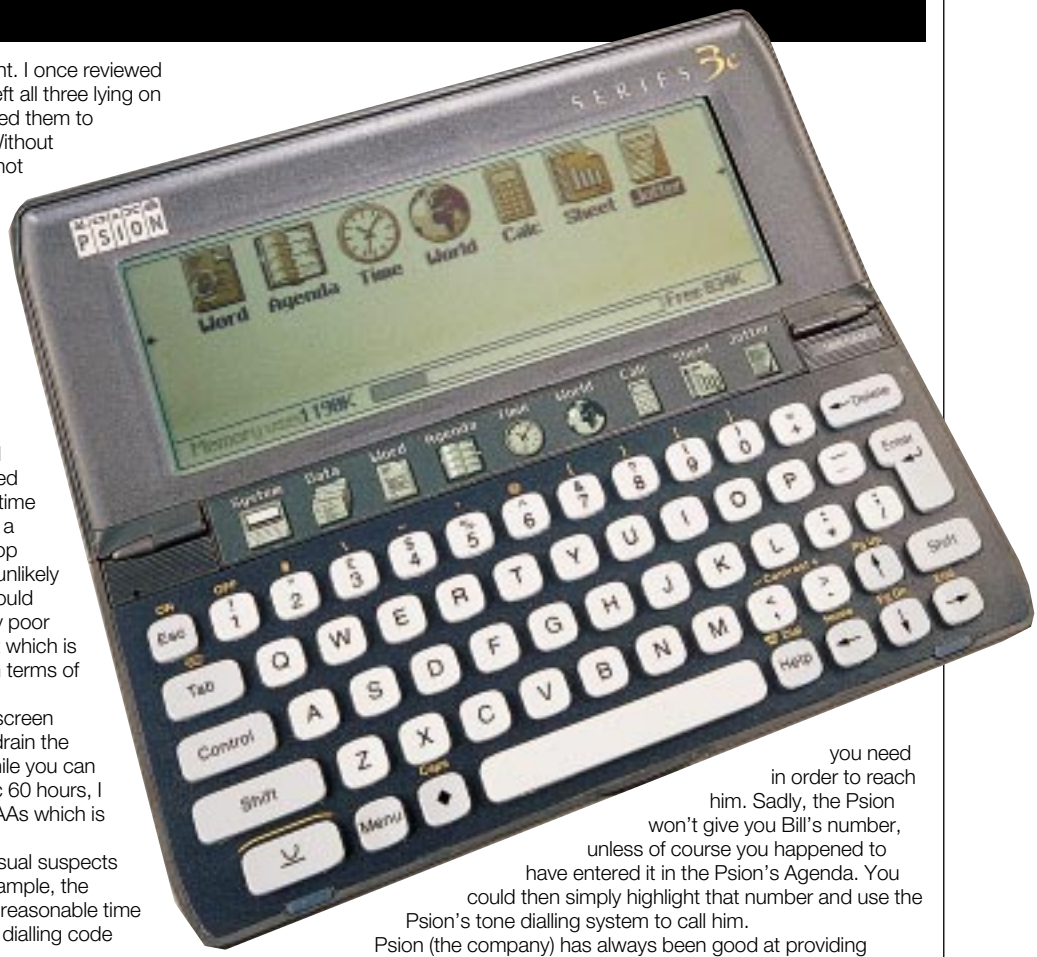
Gordon Laing, Journalist: Nokia 9000 Communicator

Our very own Gordon Laing, while quite literally gadget-mad, has managed to resist the temptation of most PDAs. His paper-based WH Smith 88-page narrow ruled notebooks, complete with home-made diary, things-to-do lists and crude drawings have become legendary in the business — "A bargain at only 79p!" he enthused. "I can make notes using my pen and pad. A PDA needs to offer built-in comms to get me interested," which is why he used a Nokia 9000 for the best part of a year. "There's no messing around with cables or adapters. If you want to send an email or fax you can just do it." He did, too, from a variety of locations, and also regularly logged onto Cix. He wasn't so impressed with the basic web browser though, albeit limited mostly by GSM's bandwidth of 9600bps. He stopped using the 9000, however, because it was too big and heavy. "Squeeze mobile comms into a Psion, PalmPilot or CE and you've got my money!"

Simon Rockman, Publisher: Nokia 9000i

Although he found the software bundled with his Nokia 9000i slightly lacking at first, Simon loves its faxing capabilities. "You can fire off an angry note while you're on the tube, then send it as you're walking from the station to the office," he says. It could do with a spreadsheet and the to-do lists don't stack, but its telephony functions are second to none, retaining complete logs of everyone you've called and the people who have called you as well as bringing up relevant caller details each time the phone rings. The screen and keyboard are both a little small and the zoom function makes reading incoming faxes a little difficult, but the alternative is to do without as there is nothing else on the market doing the same job. At 1kg it is a little heavy for a mobile phone — many models are a tenth of that. But then, they don't have so many functions.

Psion 3c



The Psion Series 3c is a tactile delight. I once reviewed three very different palmtops and left all three lying on my desk. As people came in, I invited them to examine the machines while we talked. Without exception, all of them ended up holding (not to say fondling) the Psion. In itself this is unimportant, except to give an indication of the care which has gone into the machine's design.

Take the keyboard: it is of course far too small, but it *has* to be: after all, the Psion will fit into your pocket. Nevertheless I have typed, quite literally, tens of thousands of words on that keyboard without undue strain, so it is obviously just large enough for me.

Then there is the screen. The size and resolution were poor on the 3 but improved dramatically for the later versions. By the time the 3c arrived the screen was, and still is, a delight; indeed, it remains the best palmtop screen I have ever used. It is readable at unlikely viewing angles and low light levels that would defeat many other machines. Under really poor conditions you can resort to the backlight which is powerful, restful and impressively even, in terms of light intensity, across the screen.

A cynic might expect this paragon of screen technology, particularly the backlight, to drain the batteries at a depressing rate; but no. While you can forget the manufacturer's wildly optimistic 60 hours, I regularly get over 30 hours from a set of AAs which is extraordinarily good.

The built-in software includes all the usual suspects and some highly usable surprises. For example, the World Time will tell you not only what is a reasonable time to ring Bill Gates in Seattle, but also what dialling code you need in order to reach him. Sadly, the Psion won't give you Bill's number, unless of course you happened to have entered it in the Psion's Agenda. You could then simply highlight that number and use the Psion's tone dialling system to call him.

Psion (the company) has always been good at providing software development tools for its products, so the range of third-party software (freeware, shareware and purchaseware) has become enormous. It ranges from pre-built worksheets for the spreadsheet, through utilities such as file managers, to complete packages such as Steve Litchfield's Mapper, a complete roadmap of the UK that also includes data sets for France and other countries. Steve has also added support for GPS (Global Positioning Systems) so you can tie a GPS unit to the Psion and have a moving cursor on the map which shows your current position. (Steve's web site is ourworld.compuserve.com/homepages/slitchfield/).

In many ways this application exemplifies what distinguishes the Psion from many other palmtops. It is not just an address-list holder; it is a real computer and as such can become whatever the software tells it to be.

Add-on hardware is also available, from PC connection cables through modems to fax machines. Given just the cable you can connect to a PC, transferring files and indeed backing up the entire Psion to the PC's hard disk. Given a modem and the right software you can surf the web and read your email, all from a machine that fits in your pocket.

Mark Whitehorn

PCW Details

Contact Psion 0990 143050 www.psion.com

Price £299.95 (inc VAT)

Good Points Attractive, well designed and packed full of useful software. As it is a "real" computer, the range of extras is massive.

Bad Points No touch-sensitive screen or handwriting recognition.

Conclusion I must sound like a total convert to the Psion Series 3c, and that's because I am. I will change my views when, as is inevitable, something better comes along. But it hasn't yet.

Screen	★★★★☆
Keyboard/Input	★★★★★
Features	★★★★★
Linking with PC	★★★☆☆
Comms	★★★★☆
Overall	★★★★★

Case Studies

Chris Cain, Editor: Psion 3c

Chris admits to having something of a Psion 3c dependency: "I'd be lost without the Psion's agenda function." He bought it initially for contacts, calculator and diary use, and now also uses the word processor and spreadsheet. Gripping the unit in both hands and using his thumbs to press the keys, he can make reams of notes on trains and buses. Chris has only one criticism of the Psion 3c: every now and again, the backup battery falsely reports that it has failed; but this is more of a nuisance than a real concern. The only improvements he would make to the design are a Psion 5 keyboard and a larger screen.

On a trip to the United States he programmed the spreadsheet to work out currency conversions from sterling, taking into account the different sales-tax rates in different states. "I also planned a diet using it, but that didn't work so well."

Jim Haryott, Editorial Assistant: Psion 3c

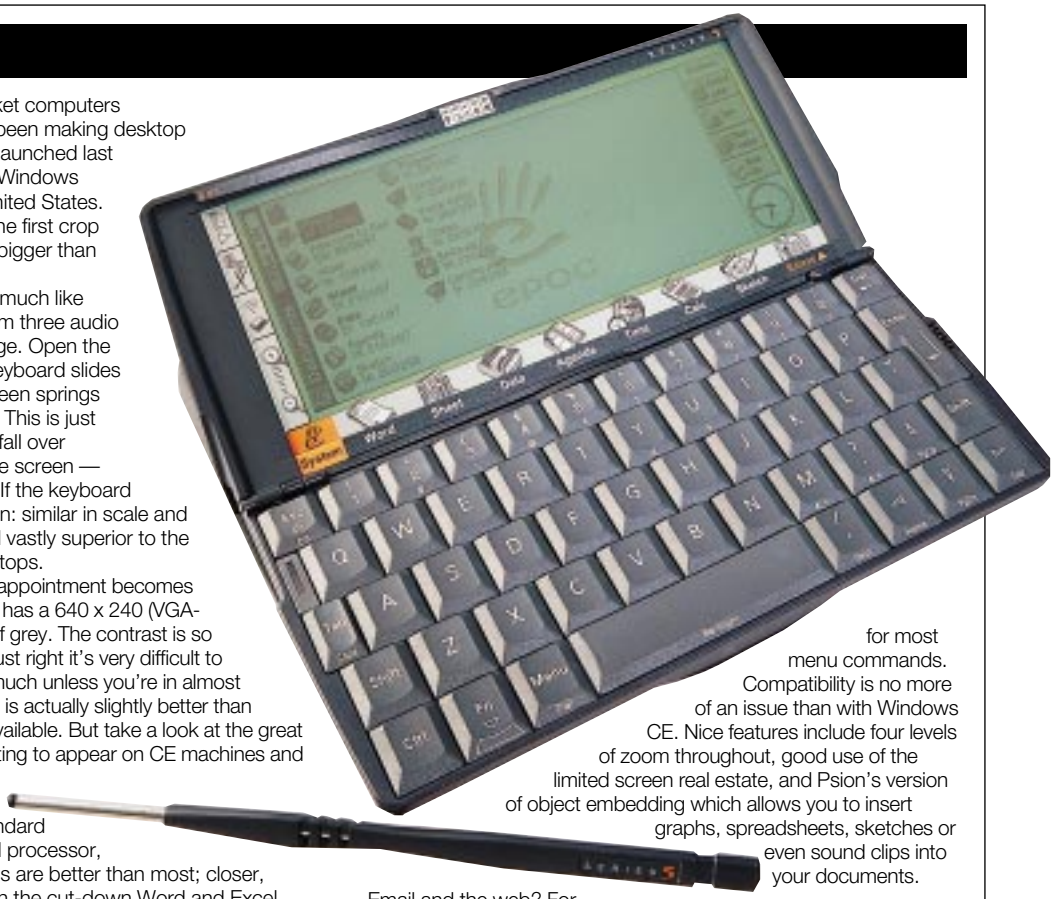
The Psion 3c is Jim's first Personal Digital Assistant. "I basically wanted something to replace my filofax," he said, and indeed, having had it for six months, this is what he does use it for. He has yet to exhaust his first set of batteries.

Although he has an early model without backlight, Jim still rates the screen as "adequate" for his needs. However, he is not so happy with the keyboard: bigger keys would be an improvement though he is fond of the application keys. He adds that, given the funds, he would rather go for a Psion 5 with its famous keyboard.

Jim is more than happy with the simplicity and ease of use of the supplied software. So far, he has not used any third-party applications but he does plan to load a Spectrum emulator in the near future.

p246 ➢

Psion Series 5



Psion has been producing pocket computers for nearly as long as IBM has been making desktop PCs. Its latest is the Series 5, launched last autumn at around the same time as Windows CE palmtops first appeared in the United States. The Series 5 is slightly smaller than the first crop of CE machines and only marginally bigger than the 3 Series it replaces.

Closed, the Series 5 looks pretty much like any other pocket computer apart from three audio recording buttons along the front edge. Open the lid, though, and its notebook-style keyboard slides forward, out of the case, and the screen springs back to rest in a very stable position. This is just about the only palmtop that doesn't fall over backwards the first time you poke the screen — important for a pen-based machine. If the keyboard looks great, it's even better to type on: similar in scale and feel to that on Toshiba's Libretto and vastly superior to the calculator-style efforts on other palmtops.

Switch it on and the first great disappointment becomes apparent — the screen. The Series 5 has a 640 x 240 (VGA-width) display with up to 16 shades of grey. The contrast is so poor that unless the ambient light is just right it's very difficult to read. The backlighting doesn't help much unless you're in almost total darkness. In fairness, the screen is actually slightly better than many of the CE palmtops currently available. But take a look at the great (if power-hungry) colour displays starting to appear on CE machines and you'll realise that Psion needs to address this issue with urgency.

Built-in software includes the standard suite of palmtop applications— word processor, spreadsheet, diary, database. Psion's are better than most; closer, certainly, to full desktop versions than the cut-down Word and Excel that ship with Windows CE. Look-and-feel is similar enough to Windows applications, too, and standard Windows shortcuts are used for most menu commands. Compatibility is no more of an issue than with Windows CE. Nice features include four levels of zoom throughout, good use of the limited screen real estate, and Psion's version of object embedding which allows you to insert graphs, spreadsheets, sketches or even sound clips into your documents.

Email and the web? For anything beyond text-based stuff (a simple VT100 comms program is included in ROM) you will have to download Messaging Suite which is freely available from Psion's web site. This package includes fax (sending and receiving), email and web browser. The fax side of things works in a similar way to Winfax on the PC, through a print-to-fax driver. You can send a fax from any application that supports printing, and this includes text and any embedded graphics in, for example, Psion's word processor. Received email and faxes are stored in a single "universal" in-box. Messaging Suite supports TCP/IP and POP3 protocols. The web browser supports standard features such as graphics and tables but, sadly, not frames. You can save pages or bookmark them.

Psion has just announced InSync, a program which allows Series 5 users to synchronise with Lotus Notes and, before the end of the year, a full Notes client.

Despite some problems — the display being the most serious — the Series 5 manages to hold its own against stiff competition – notably from Hewlett-Packard and from Windows CE itself. But unless the rumoured upgrade, which will fix a few bugs and add some major features, materialises soon and Psion finds a better source of display panels, Windows CE will start to look more and more attractive. Having said that, this machine is worth buying for its keyboard alone.

Mick Andon

PCW Details

Contact Psion 0990 143050 www.psion.com

Price £429.95 (8Mb), £399.95 (4Mb); inc VAT

Good Points Keyboard. Ingenious case design. Built-in software. Integration with Windows.

Bad Points Poor screen contrast and backlighting.

Conclusion The basic concept and design are spot on, but the Series 5 is badly let down by its poor screen, especially when compared to Hewlett-Packard's latest offering.

Screen	★★☆☆☆
Keyboard	★★★★★
Features	★★★★☆
Linking with PC	★★★★☆
Comms	★★★★☆
Overall	★★★★☆

Case Studies

John Sabine, Staff Writer: Psion 5

John admits he was not convinced of the usefulness of PDAs before buying his Series 5. But now, having used it for six months, he is a self-confessed convert. "I don't know what I'd do without it now. All my contacts are in there and, although the screen reflects a lot of light, the keyboard is excellent." He admits the keys are a little stiff, but as he is a two-fingered typist, the fact they need a firm tap does not affect him. He is also a fan of the audio recording function, something that he only uses now and again but "it's nice to know it's there if I need it".

Surfing the web does not form a big part of his Psion activities but he has experimented with getting online and found the experience reassuringly straightforward. John has also garnered, via the internet, a Spectrum Emulator and a version of Doom for the Series 5.

Mark Whitehorn, journalist and writer: Psion 5

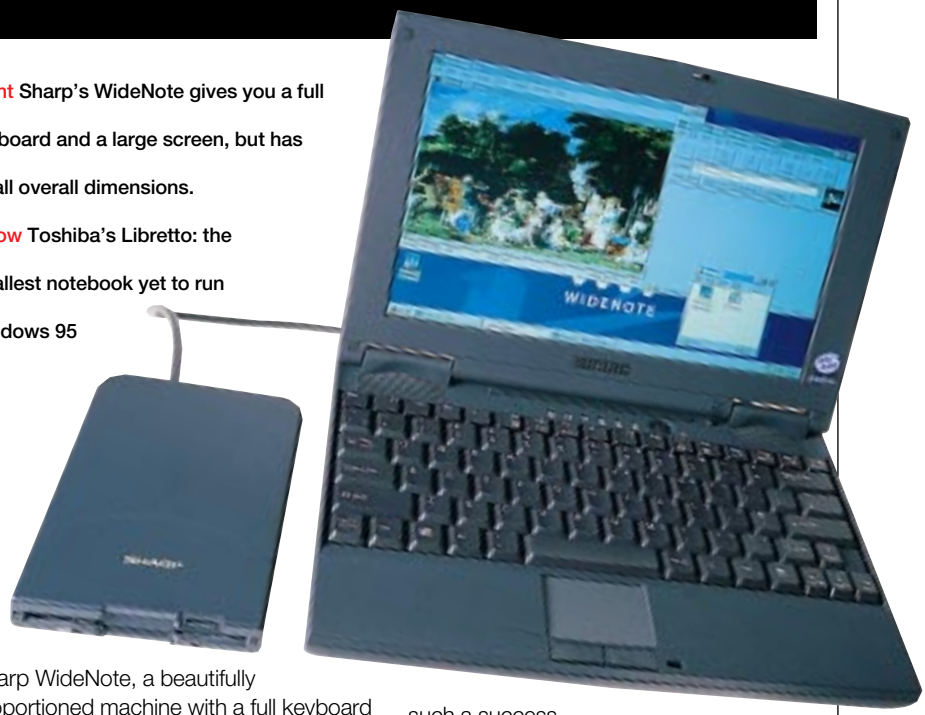
Mark is a self-confessed gadget addict, having used every single Psion from the Series 3 onwards. He does everything on his palmtop: keeping his contacts up to date, using it to write while travelling, and using the World Time feature far more than he thought he would.

He is a fan of the Psion 5 but admits to preferring the Series 3c: "The screen is clearer, with a better backlight… and I never use the touch screen because I am used to the keyboard shortcuts." The battery life is another concern: he manages only three and a half hours on a set of fresh batteries, compared with 30 for the 3c. "The problem is that I need the backlight on the Series 5 and this puts a heavy drain on the batteries."

Despite his own preference for the Series 3c, Mark would still recommend the Series 5 to anyone who wants a PDA with a touch screen.

p248 ➢

Sub-notebooks



Right Sharp's WideNote gives you a full keyboard and a large screen, but has small overall dimensions.

Below Toshiba's Libretto: the smallest notebook yet to run Windows 95

The Japanese mania for miniaturisation has produced some weird and wonderful inventions, but perhaps among the most useful products are machines that blur the distinctions between PDAs and notebooks. The common conception is that notebooks are desktops in a smaller box, but they will not weigh much less than 6lbs. PDAs, meanwhile, are small and light enough to fit in your pocket but they use a completely different set of applications to the one on your desktop, you cannot type comfortably on them, and in an unkind light they can be regarded as vastly expensive filofaxes. Sub-notebooks cross the divide. While not small enough to fit in your pocket, they are typically half the size and weight of an ordinary notebook, they run a full version of Windows 95 on an Intel processor and have enough RAM to run the same applications you would use on your desktop.

When sub-notebooks initially hit the market they were more like small notebooks than PDAs. The first of these was HP's OmniBook 800, a marvel at just 3.9lbs but with a P166MMX, 16Mb of RAM and a 10.4in screen. However, several other models started to crowd the market, making the OmniBook look positively dowdy. First there was the Sharp WideNote, a beautifully proportioned machine with a full keyboard and a thinner, wider screen of 5.5in high and 9.6in wide. This gives you a viewable area of 11.2in and a resolution of 1024 x 600 but on a notebook which is small in every other dimension. Toshiba pitched in with the Portegé 300CT, which again has a wide-aspect screen, not surprisingly made by Sharp.

However, there are some even smaller notebooks about. These mini-notebooks were originally designed for the Japanese market and most pundits said they would never sell in the UK, but due to popular demand they are now available here. The most well known is Toshiba's Libretto, a revelation for most people when they first see it. At a minute 8.3in x 4.5in x 1.4in it is by far the smallest notebook ever seen, but at the same time it still packs a powerful punch: the latest version has a P120MMX (yes, Toshiba has enough clout to get Intel to make chips especially for them), a 1.5Gb hard disk, 16Mb of RAM and a 6.1in TFT screen.

Since Toshiba has made such a success of the Libretto, other manufacturers have begun to follow suit. Go to the electronic district in Tokyo and you will find any number of tiny notebooks, all running Windows 95. And there were more than a few of these little cuties shown at Comdex in Las Vegas last year. Sharp has several models and NEC is another of the main protagonists with the mobio NX, although as yet these are only available in Japan.

Hitachi demonstrated the VisionBook Traveler at Comdex, which looks remarkably similar to the Opti we have reviewed in this issue (*First Impressions, p143*) and Mitsubishi showed the Amity which is a little lighter than the VisionBook Traveler, along with the ultra-light and ultra-thin Pedion. Hopefully a large percentage of these will get to Britain eventually, although we may be in for a long wait.

There has to be a downside to all this, and apart from the tiny keyboards which are a bit of a pain to type on, and the little screens, the main disadvantage is of course the price. You have to be in serious funds even to contemplate moving to a sub-notebook from a PDA. While one of our advertisers is offering a Libretto 50CT for a mere £839 ex VAT, which is only around £200 more than the HP 620LX, most of the models we have talked about are more like normal notebooks in price, ranging from £1,200 to around £2,400.

Adele Dyer

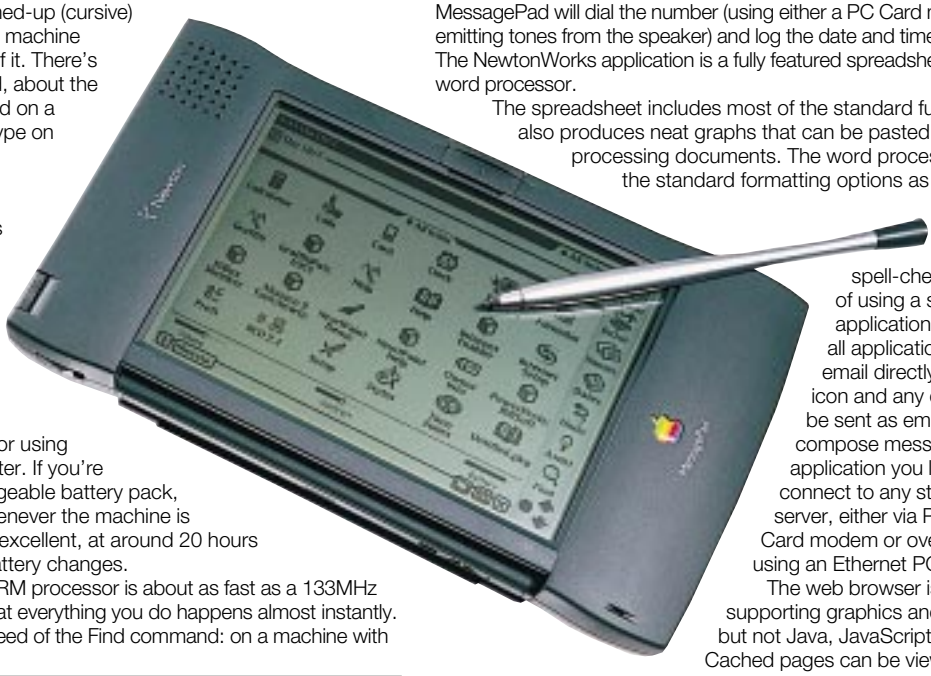
p252 ➢

Apple MessagePad 2100

The MessagePad 2100 is the latest in the line of Apple Personal Digital Assistants and proves how far the company has come since its early models. It's targeted at mobile professionals, the kind of person who regularly takes a laptop computer on the road but needs something that's a little lighter and easier to carry.

Physically the MP2100 is about the size of a reporter's notebook, with no built-in keyboard. Open the cover and you'll see why: most of the front is devoted to a big screen, measuring 83mm x 129 mm. This screen is one of the 2100's strong points, as it's extremely readable in all lighting conditions thanks to the backlighting and anti-reflective coating. The screen image can also be rotated, allowing you to work in either portrait or landscape modes as appropriate.

The screen is also your main input device. The Newton Operating System allows you to write on the screen and have your handwriting converted into text. The handwriting recognition isn't perfect, although it's much improved since the early days. If you write each letter separately rather than joined-up (cursive) writing, you'll find that the machine makes an adequate job of it. There's also an optional keyboard, about the same size as the keyboard on a laptop, which is a joy to type on when compared to other handhelds.



The 2100 comes with two Type II PC Card slots and the Newton InterConnect port, a multi-function port that can be used for connecting the keyboard or linking to a desktop PC. There's also a small speaker and microphone, and a port for using the supplied power adapter. If you're using the optional rechargeable battery pack, this will be recharged whenever the machine is plugged in. Battery life is excellent, at around 20 hours constant use between battery changes.

The 162MHz StrongARM processor is about as fast as a 133MHz Pentium, which means that everything you do happens almost instantly. Most impressive is the speed of the Find command: on a machine with 1000 contacts, 600Kb of notes and about 4Mb of other data, finding 150 instances of the word "Apple" took about three seconds. The standard bundled software bundled includes a notepad, datebook, address book, internet email, web browser, and the NewtonWorks application that includes both spreadsheet and word processor. The notepad is a simple application for jotting notes and drawings but has the advantage of an extensible architecture that means you can add different stationery types: included are a lined note, checklist and outline, and a sound note for capturing sound using the built-in microphone.

The Dates application is perhaps the weakest of the built-in programs.You can have one To Do list, so you can't separate personal tasks from work ones and you can't link events to contacts in the address book. However, the Names application is very good, allowing you to store names, addresses, and multiple phone numbers and email addresses. Tap on the icon next to a phone number and the MessagePad will dial the number (using either a PC Card modem or emitting tones from the speaker) and log the date and time of the call. The NewtonWorks application is a fully featured spreadsheet and word processor.

The spreadsheet includes most of the standard functions and also produces neat graphs that can be pasted into word-processing documents. The word processor includes the standard formatting options as well as a spell-checker. Instead of using a separate application, all applications support email directly. Tap on an icon and any document can be sent as email, so you can compose messages in any application you like. Email can connect to any standard POP3 server, either via PPP using a PC Card modem or over Ethernet using an Ethernet PC Card.

The web browser is simple, supporting graphics and forms but not Java, JavaScript or frames. Cached pages can be viewed offline, although the cache can eat up memory if you try and keep too many pages.

Third-party software is plentiful. Just about every category is catered for, from simple add-ons for the Notepad through to personal finance applications and NNTP newsreaders. Connectivity with desktop PCs, though, is disappointing. The bundled connection software, Newton Connection Utilities, allows you to transfer documents to and from all the built-in applications, but synchronisation can be a hit-and-miss affair.

The MP 2100 is a very capable PDA, with good built-in features and a lot of raw processing power and flexibility. If you're after something that can replace a laptop on trips, then this is the first machine you should look at.

Ian Betteridge

PCW Details

Contact Apple 0800 600 6010
Price £734.38 (RRP, inc VAT)
Good Points The built-in applications are good, especially the word processor and the spreadsheet, and the internet connectivity is very good.
Bad Points The handwriting recognition, despite many improvements, still takes too long to adapt to. Synchronisation is poor. And why isn't the excellent keyboard included as standard?
Conclusion A machine that can replace a diary, address book, notepad and your laptop — as long as you can live with the handwriting recognition.

Screen	★★★★☆
Keyboard/Input	★★★☆☆
Features	★★★★☆
Linking with PC	★★★☆☆
Comms	★★★★★
Overall	★★★★☆

Case Studies

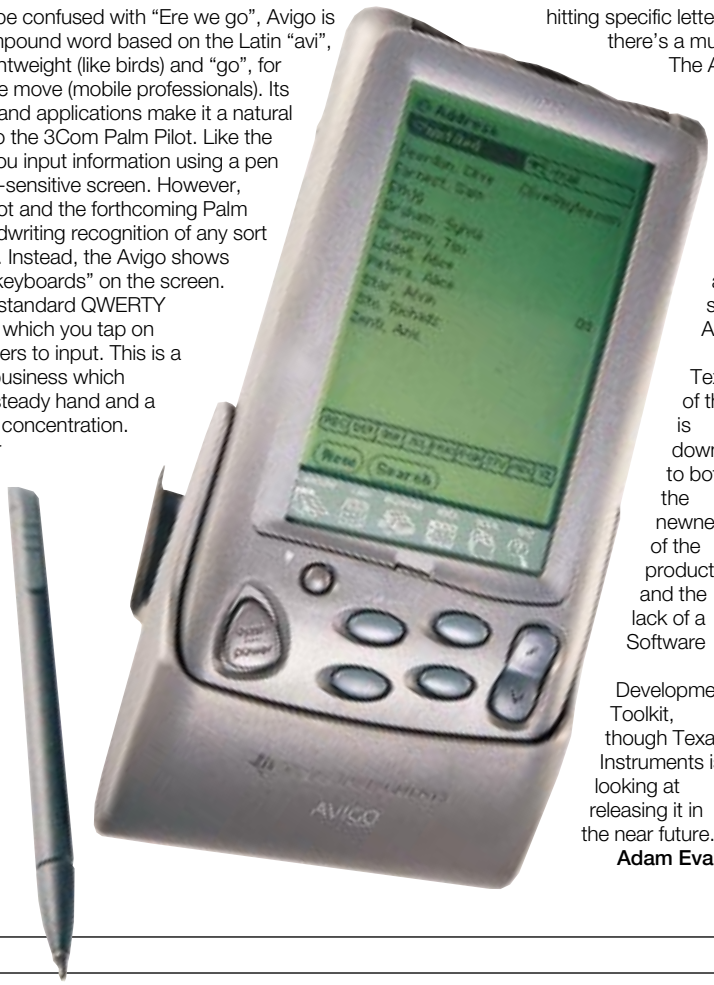
Michael Eagleton, Management Consultant: MessagePad
Michael Eagleton bought one of the first MessagePads on the strength of brand loyalty to Apple and the fact that at the time, other PDAs seemed like pretenders. The handwriting recognition was important, and he found that it worked fine so long as you didn't mind putting in some time teaching the system. Michael also found the ability to draw diagrams and have the MessagePad straighten up the lines very useful. A direct connection to his StyleWriter printer proved useful, as did the third-party PocketCall software, offering terminal emulation and fax capabilities. Michael accepted the MessagePad's limitations, but sold his model after 18 months. He now happily uses paper and pen.

Keith Martin, journalist: MessagePad 2100
Keith says that the best thing about the MP2100 is that "It's easy! It's nice to be able to scribble on it and have it as a picture or convert it to recognised text." He is playing with some infra-red emulation software with which he hopes to train his MessagePad to control the TV, video and stereo. Keith picks up and sends email over AOL, and once emailed his office-bound collegues from a tent in the middle of a festival field "just for the hell of it". The ability to rotate the display to landscape, together with the add-on keyboard, makes word processing and other such tasks a pleasure. A set of batteries generally last him a couple of months, with half an hour's use every day playing games on the train.

Texas Instruments Avigo 10

Not to be confused with "Ere we go", Avigo is a compound word based on the Latin "avi", for lightweight (like birds) and "go", for people on the move (mobile professionals). Its appearance and applications make it a natural competitor to the 3Com Palm Pilot. Like the Palm Pilot, you input information using a pen on the touch-sensitive screen. However, unlike the Pilot and the forthcoming Palm PCs, no handwriting recognition of any sort is supported. Instead, the Avigo shows one of two "keyboards" on the screen. The first is a standard QWERTY keyboard on which you tap on individual letters to input. This is a slow, fiddly business which demands a steady hand and a great deal of concentration.

The other keyboard, titled the Intelligent T9 keyboard, is an attempt at an entirely different method of input. The keys are grouped together in threes: ABC, DEF, GHI (you get the picture) and instead of hitting specific letters, you go for the group. The advantage is that there's a much bigger area to hit on the screen for each letter. The Avigo guesses the word you mean and, surprisingly, is actually quite good at it with words of four letters or more.



The screen itself is clear, with a well-defined display, and some of the applications are able to flip it 90 degrees, making full use of the width of the screen. There is a flip-over cover for it which, by dint of cunning design, lies flat against the back of the unit when uncovered. The docking cradle is another example of good design: it lies flat for storage but springs up to form a solid base for the Avigo when you want to connect it to your PC.

Extra software is in the form of four games on the Texas Instruments web site and a few dribs and drabs of third-party software. The lack of third-party software is down to both the newness of the product and the lack of a Software Development Toolkit, though Texas Instruments is looking at releasing it in the near future.

Adam Evans

PCW Details

Contact Texas Instruments 0181 230 3184 www.ti.com

Price £229 (£194.90 ex VAT)

Good Points Flip-over cover. Cool design.

Bad Points On-screen keyboard is fiddly.

Conclusion Not bad, but not as good as the PalmPilot.

Screen	★★★☆☆
Keyboard/Input	★☆☆☆☆
Linking with PC	★★★★☆
Features	★★★☆☆
Comms	☆☆☆☆☆
Overall	★★☆☆☆

The Palm PC

Not content solely with developing the Handheld PC, Microsoft recently announced the Palm PC standard. Not to be confused with the Palm Pilot product from 3Com, Palm PC is a set of specifications which manufacturers can use to create their own machines. As with the Handheld PC standard, Microsoft Windows CE is at the heart of this new venture.

The basic concept behind the Palm PC is that it should be palm-sized, supporting one-handed operation, easy input, wireless communication and simple synchronisation with a desktop PC. Voice recording and natural, single-character handwriting recognition are also included in the baseline definition. The minimum technical specifications, as laid down by Microsoft for making this possible are: 32-bit processor, 2Mb RAM, 6Mb ROM, 240 x 320 resolution touch screen, infra-red port, stylus, speaker, microphone, application-switching buttons and a Compact Flash slot. In addition to natural handwriting recognition, Palm PCs will support a "soft" keyboard, where an image of a normal keyboard is displayed on the screen and users choose letters by tapping the touch screen.

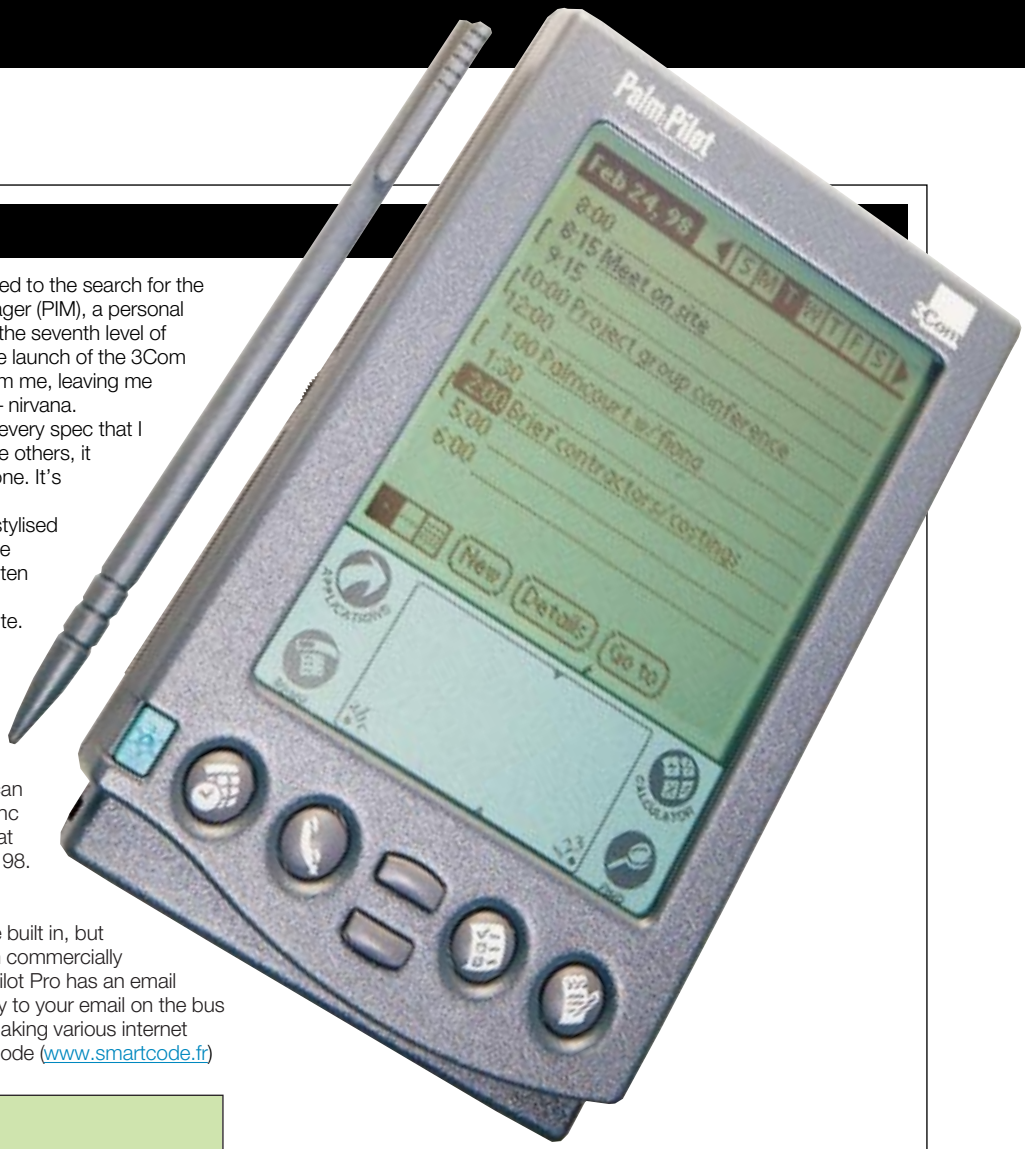
The standard applications in Windows CE for the PPC are Pocket Outlook, Voice Recorder, Note Taker, Solitaire, Calculator, World Clock and Mobile Channels. The latter is essentially an off-line web browser using files downloaded automatically from a PC. The addition of wireless communication technology could make Mobile Channels an easy way for a company to push updated information to its workforce. Microsoft also says that 69 other applications have been announced from third-party vendors.

At a recent press event, a Microsoft spokesman ambitiously predicted that in fifteen years, everyone in the room would have a Palm PC-type device. So far, seven manufacturers are promising PPC products, including Casio, Samsung and Philips. The first UK shipments are promised for the second quarter of 1998.

Adam Evans

p254 ➢

PalmPilot 500



My life, such as it is, has been devoted to the search for the perfect Personal Information Manager (PIM), a personal holy grail, on completion of which the seventh level of nirvana would surely be mine. And since the launch of the 3Com PalmPilot, my purpose has been ripped from me, leaving me alone in my — admittedly well-organised — nirvana.

You see, the PalmPilot fills pretty much every spec that I need. It is the most portable of PDAs. Unlike others, it wouldn't ruin the cut of a nice suit, if I had one. It's hardly bigger than a pack of cards.

The main input method is pen, using a stylised writing technique called Graffiti. Most people blanch at this, but no-one takes more than ten minutes to become capable at it. I soon reached a speed of about 20 words a minute.

The other main input method is synchronisation, the PalmPilot's *raison d'être*. It was built with easy synching in mind and it works: drop it in the cradle, push one button and two-way synching is done. Better still, there are now "conduits" available for most PIMs so you can use your fave, from companies like IntelliSync and Dataviz. Personally, and for reasons that you'll have to trust are viable, I use Outlook 98. But the point is, it just works.

The PalmPilot comes with basic diary, contacts, note-taking and task-list software built in, but more and more is becoming available, both commercially and as shareware. For example, the PalmPilot Pro has an email synchroniser in it, so you can read and reply to your email on the bus home. It also has a built-in TCP/IP stack, making various internet applications available. Of these, the Smartcode (www.smartcode.fr) HandStamp for email, HandWeb for browsing and HandFax for, er, faxing are the ones that I use.

There are also some superb accessories now available. USR makes a smart clip-on modem, and Option International (www.option.com) makes a GSM version. The slip-in case that it comes with is adequate but I recommend either a USR case or, if you want the coolest in cases, consider the Rhinoskin (www.rhinoskin.com) Rhino Pak, a little rucksack for your PalmPilot. You can also get pens — the supplied pen is too small and light — such as the PDA Panache (www.pdapanache.com), Duo pen (twist one way for a biro, the other for a Pilot stylus) or the Beacon, which has a little LED in it to light up your screen.

You can even increase your memory from the standard 1Mb to 3Mb with the easily installed TRG SuperPilot memory board.

For software, there's tons of shareware — utilities, games, email packages, outliners — and some top-quality commercial software such as CES's QuickSheet spreadsheet with Lotus 1-2-3 and Excel synchronisation.

All in all, the PalmPilot is my favourite bit of kit — at least until the PalmPC, with its higher-definition screen and built-in sound, comes along. Then, my search, and my life, might resume…

Paul Smith

Case Studies

Stuart Thomas, Radio News Reader: PalmPilot

Stuart Thomas knew someone who raved about their PalmPilot to such an extent that he had to see for himself what all the fuss was about. He ended up using it for his contacts and dairy but found it surprisingly usable for note-taking. After initial suspicion of the Grafitti handwriting, he'd learnt the basics after only one day and mastered it by the end of the week. He wasn't too impressed with the built-in applications, but quickly discovered that whatever it was you wanted your PalmPilot to do, somebody had already written it and popped a copy on the web for downloading. Before long he'd settled on a couple of web browsers, PalmScape for great text and TG Wingman specialising in images, which come in handy for picking up the latest news headlines. TG Postman allowed him to pick up emails while he was away, and an image viewer proved very useful for displaying scans of maps. Stuart can't wait to try out a cellular modem.

Neil Mossey, BBC Comedy Development: PalmPilot

Neil Mossey's first brush with a PDA came from a cheap Casio, but its lack of PC connectivity left him worried about potentially lost or crossed information. After spotting tons of opportunities to use a PDA and a firm recommendation from a friend, he plumped for a PalmPilot with modem. He lives his busy life around Schedule + at work, but found the PalmPilot's built-in software inadequate for synchronising with his strict user preferences. He ended up buying Desktop-to-go from Puma which syncs to his PC with zero effort. He's downloaded and tried out various email and fax packages but only uses them in emergency situations; he also tried PalmScape and TG Wingman but personally found PalmPilot web browsing no more than a novelty. He also discovered switching the alarm sound off doubled his battery life. Neil particularly likes the PalmPilot's size and looks, and that he can handhold it, whereas Psion-owning colleagues have to rest theirs on a desk.

PCW Details

Contact 3Com 0800 225252

Price Pro £229, Personal £169 (both inc VAT)

Good Points Small enough to fit in any pocket, powerful enough to do the job. Great synchronisation.

Bad Points It's not a fully-fledged computer and it isn't fun writing long articles on it.

Conclusion The best PDA I've used.

Screen	★★★★☆
Keyboard/Input	★★★★☆
Features	★★★★☆
Linking with PC	★★★★★
Comms	★★★★☆
Overall	★★★★☆

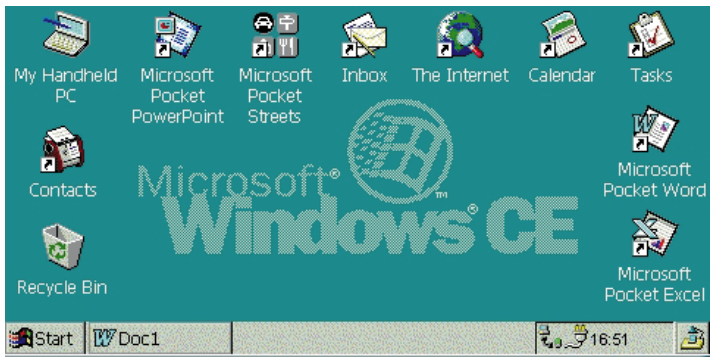
p256 ➢

Microsoft Windows CE

Everybody has a pet theory about the real meaning of CE. Leaving aside the various cheeky definitions, the most likely one is Consumer Electronics. It is an important point, because it demonstrates Microsoft's real goal in producing Windows CE. It is not just for Handheld PCs; everything from vending machines to video recorders could eventually have CE as their operating system.

Along with the Handheld PC and Palm PC (*p253*), Microsoft has recently launched another ambitious standard using Windows CE: the Auto PC. The company is hoping that computers using this standard will feature in the cars of the future, providing route directions, email and entertainment functions. The Auto PC will be entirely voice controlled and will even be able to read your emails to you as you drive along.

The Handheld PC is actually a standard set of specifications which manufacturers have to abide by if they want to use CE as their operating system. The basic HPC standard includes sound, a touch-sensitive screen and infra-red capability. Version 1.0 of CE arrived in late 1996 but never really made an impact in the UK. CE 2.0 is a much more exciting prospect, with many more manufacturers promising UK products. Unfortunately, it now appears that we will not see the majority of them until summer at the earliest.



Windows CE 2.0 is designed to look and feel just like Windows 95, to make users feel immediately at home when switching from their desktop PCs. It is important to realise that the operating system is not a cut-down version of Windows 95 or NT 4. Applications written for these PC platforms will not run on palmtops, but programmers can write applications that look and feel much the same as the PC versions. A host of third-party software has already been announced, including the first voice recognition application for CE.

File formats, for Pocket Word, Pocket Excel and so on, are different and have to be converted when transferring files between a palmtop and a PC. This is one of the functions of the CE software that sits on your PC. It also allows you to access all the directories on your palmtop from the PC (but not launch applications or view files), synchronise files that are held on both machines, and transfer individual files from one computer to another.

In version 2.0 of Windows CE you can use the standard Windows 95 explorer to browse the palmtop, and the file synchronisation tool, ActiveSync, offers continuous background synchronisation and can synchronise files and mail messages as well as appointments, contacts and tasks.

Pocket Internet Explorer has been integrated into the Windows CE 2.0 file and folder browser, so can browse the internet from the same window you use to browse local files and folders (as with Internet Explorer 4 for Windows 95).

Pocket Word and Pocket Excel have a new zoom feature, and new document and spreadsheet templates are included to help you quickly structure and format your files. Pocket Excel has a particularly handy expense-report template and new split pane and freeze pane features which allow you to keep column headings at the top of your spreadsheet as you scroll down and compare different parts of a spreadsheet on screen simultaneously. Pocket Word now has a spell-checker, but the major glaring omission from CE 1.0, the word-count facility, has still not been implemented.

The applications that comprise Pocket Outlook — Calendar, Contacts, Tasks, Inbox — now work more closely together to give features similar to Outlook on your desktop PC. Meetings can be scheduled using Calendar, then meeting notices can be sent through Inbox using email addresses entered in Contacts. Notes can be attached to appointments, contacts and tasks. A new application, Pocket PowerPoint, allows you to show presentations created in PowerPoint on a PC. No editing is possible, but you can annotate slides by drawing on the touch screen.

Adam Evans

p260 ➢

Casio Cassiopeia

At first glance the Cassiopeia looks like a rather ungainly palmtop, a boxy affair compared to the sleek Philips Velo, for instance. There's a nicely-hinged display and a curiously industrial-looking keyboard. We approached it with some trepidation and a few experimental presses soon reveal a "spongy calculator" feel. But when it comes to typing information at speed, the this keyboard is actually one of the best we have used. The secret is the extraordinarily light action of the keys: you just have to rest your finger on one for it to register. It is imperative that you keep the audible click on, however, as there is no real physical feedback from the keys. The screen produces a healthy 640 x 240 resolution with four shades of greyscale and a decent backlight. The only drawback is the usual touchscreen problem: increased glare and reflectivity from the touch-sensitive coating.

The Cassiopeia has one unique feature: a dedicated socket for linking to a digital camera. (At present this only works with a couple of Casio cameras.) While this is undoubtedly a "good thing", it's a shame that more progress is not being made in the area of wireless infra-red comms.

Adam Evans

PCW Details

Contact Casio 0181 450 9131 www.casio.com
Price £499.99 (£425.53 ex VAT)

Good Points Digital camera link. You can type fairly quickly on the keyboard...
Bad Points ...but it still feels cramped.
Conclusion One of the better CE offerings.

Screen	★★★☆☆
Keyboard/Input	★★★☆☆
Linking with PC	★★★★☆
Features	★★★★☆
Comms	★★★★☆
Overall	★★★☆☆

Compaq PC Companion 120

The PC Companion 120 is not officially available in the UK but some machines have been brought over here by importers. The design is reminiscent of the Cassiopeia, although, if anything, it is even more of an industrial-looking product. Its small screen is very similar to that on the Velo 1 but it lacks that model's sleek styling. There is a handy dial for controlling the contrast on the side of the screen.

The PC Companion comes with CE 1.0 and 2Mb of memory. It is possible to upgrade these but, as the machines are imported, you should check out their availability before you buy. A mains power adapter; that will cost you an extra £29.38 (VAT included). We were not impressed with the keyboard. Though similar to the Cassiopeia's, the keys are more fiddly and it is even more difficult to tell that a key press has been registered because the keys are only just raised above the level of their surroundings.

Compaq claims that two AA batteries will give you up to 20 hours of use, and there is one PC Card slot.

PCW Details

Contacts Compaq www.compaq.com; Computer Bargains 0161 798 5588
Price £233.83 (£199 exc. VAT)
Good Points One of the cheapest CE machines around
Bad Points Small screen, poor keyboard, CE 1.0, mains power supply is extra
Conclusion Consider it only if you are very short on money

Screen	★★☆☆☆
Keyboard/Input	★☆☆☆☆
Linking with PC	★★★★☆
Features	★★★☆☆
Comms	★★★★☆
Overall	★★☆☆☆

Hewlett-Packard 360LX

The 360LX's big display has a 640 x 240 resolution and is capable of 16 greyscale shades, yielding better gradation and definition than those with just four. But the best part of the screen is the backlighting. The 360LX makes use of "natural white" backlighting which, if you are used to the displays in every other non-colour palmtop around, will bowl you over with its clarity and sharpness. However, it is so good that you become reluctant to use it without the backlighting. This puts a heavy drain on the batteries, which last for around ten hours if you do not use backlighting or a PC card. If you use two rechargeable AA batteries the 360LX will automatically recharge them when it is plugged into mains power.

The keyboard is composed of small, hard, rubber keys which are angled to provide a more positive response. Although cramped and a little fiddly, it is possible to type at a semi-reasonable speed with a bit of practice, although, in Word, the 360LX struggles to keep up if you go too quickly. The 360LX also features a PC Card slot and a Compact Flash slot, and comes with a well-designed docking cradle.

Adam Evans

PCW Details

Contact Hewlett-Packard 0990 474747 www.hp.com
Price £599 (£509.79 ex VAT)
Good Points Excellent backlighting. Runs CE 2.0.
Bad Points Not the fastest machine we've seen.
Conclusion The screen makes it one of the best palmtops around.

Screen	★★★★☆
Keyboard/Input	★★★☆☆
Linking with PC	★★★★☆
Features	★★★★☆
Comms	★★★★☆
Overall	★★★★☆

Philips Velo 1

The Velo 1 is without doubt the coolest-looking palmtop around — it's a very desirable consumer object. The design of the case leads you to expect great things of this PDA but the keyboard, although similarly stylish, is not a lot of fun to type on. The keys are small, requiring accurate finger work, and need quite a push to register a keystroke. However, the layout is clear and there are shortcut keys to the standard Windows CE and Velo 1 applications.

The Velo 1 is based on Philips' own 32-bit RISC processor which certainly speeds along at a rate of knots. It is noticeably faster at opening applications and documents than many of the other palmtops in this group test. The screen is a little small, at a resolution of 480 x 240, but it is reasonably clear in most lighting conditions.

The Velo 1 runs Windows CE 1.0 (with a free upgrade to version 2.0) and comes with 8Mb RAM, running for a claimed 15 hours on two AA batteries. It has a 19.2Kbps software modem and kit for connecting to a standard land telephone line. Additional cables for connection to some GSM phones are also available.

Adam Evans

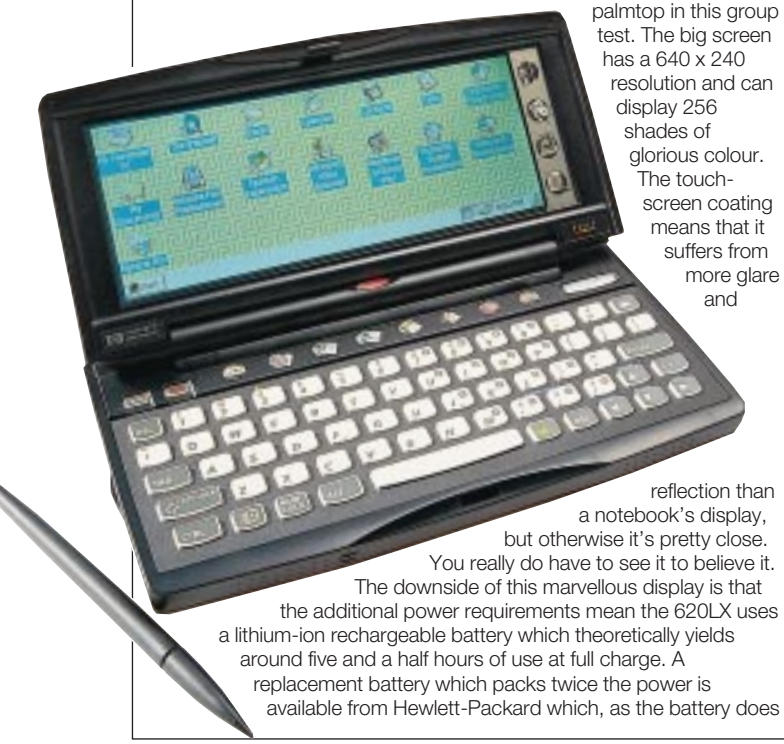
PCW Details

Contact Philips 0181 689 4444 www.velo1.com
Price £349.99 (£297.84 ex VAT)
Good Points Great looks. Fast.
Bad Points Poor keyboard. Small screen.
Conclusion Great buy, if you can live with the keyboard.

Screen	★★☆☆☆
Keyboard/Input	★☆☆☆☆
Linking with PC	★★★★☆
Features	★★★★★
Comms	★★★★★
Overall	★★★★☆

Hewlett-Packard 620LX

Hewlett-Packard is targeting the 620LX at on-the-go professionals who want an alternative to heavy notebooks. The reason the company might be successful in this venture is that the 620LX is the only colour palmtop in this group test. The big screen has a 640 x 240 resolution and can display 256 shades of glorious colour. The touch-screen coating means that it suffers from more glare and reflection than a notebook's display, but otherwise it's pretty close. You really do have to see it to believe it.



The downside of this marvellous display is that the additional power requirements mean the 620LX uses a lithium-ion rechargeable battery which theoretically yields around five and a half hours of use at full charge. A replacement battery which packs twice the power is available from Hewlett-Packard which, as the battery does not account for all that much of the weight, might be well worth the investment.

The keyboard is similar to the HP 360LX with the hard rubber keys but because the machine is slightly bigger than the others in this group, the keys are further apart and the whole thing feels a lot less cramped. In addition to the standard keyboard there are four icons next to the screen and ten special keys above the keyboard. These are all shortcuts to various applications, apart from the on/off switch and a button that automatically launches the Voice Recorder application and begins recording via the built-in microphone. Hewlett-Packard claims that its compression allows an impressive one hour of voice recording per megabyte. We weren't all that thrilled by the quality of the recordings we made, with the microphone barely able to pick anything up below a shout.

Recording can also be activated without opening the 620LX, by holding down the button on the case. This button doubles as an alarm and a useful battery-charging indicator.

The 620LX comes with 16Mb RAM as standard and has both PC Card and CompactFlash slots. A docking cradle for connection to your PC is also included.

Adam Evans

PCW Details

Contact Hewlett-Packard 0990 474747 www.hp.com
Price £799 (£680 ex VAT)
Good Points Fabulous screen. Bigger and better keyboard. Runs CE 2.0/
Bad Points Battery life is a worry. Not exactly lightening quick.
Conclusion At this price, it is a serious threat to a lot of notebooks.

Screen	★★★★★
Keyboard/Input	★★★★☆
Linking with PC	★★★★☆
Features	★★★★☆
Comms	★★★★☆
Overall	★★★★☆

PDA communications

While electronic organisers are undeniably handy, they only really come into their own when doing things an ordinary paper notepad can only dream of. Accessing your email for instance, firing a few back, maybe sending some faxes or even browsing the web — and all this while on the move too, possibly.

As far as comms are concerned, a PDA is no different from a notebook computer: you'll need some kind of modem. Most PDA modems are based on cards or clip-on modules, either proprietary in the case of Psion and the PalmPilot, or employing the PC Card standard such as Windows CE. Compatibility with the PC Card standard may provide a wide variety of products to choose from, but PC Cards draw a significant amount of power, which could leave your PDA gasping for batteries. Psion offers a PC Card adapter powered by its own batteries for its Series 3 and 5 models.

It's possible to connect some digital mobile phones to PDAs for portable comms, although the current GSM standards limit data rates to 9600bps, and of course will only operate where the phone can get decent reception. Most so-called data-capable mobile phones require the help of an additional card for connection to a notebook or PDA. Unfortunately, there is no standard for data interfaces on mobile phones (or PDAs for that matter), so it is very much a case of finding out whether a connection is available between your particular phone and PDA; most mobiles use optional PC Card data interfaces. At the time of writing, Option International had just released its Snap-On GSM adaptor for the Palm Pilot (£129 inc VAT), including versions for Nokia 8110/3110, and Ericsson 300, 600/700 mobiles.

Neater still are modems emulated using software alone. Yes, it is possible to have a PDA or notebook emulate a modem's functions, therefore only requiring a suitable cable to connect it directly to a telephone jack or mobile phone. The Philips Velo Windows CE reviewed here features a software landline modem, albeit operating at a maximum 19,200bps.

Fed up with carrying cables? Cunning Nokia has squeezed a data-ready mobile phone into this PC Card, ready to slip into a suitable PDA or notebook

Nokia has developed a software data suite for its most recent 3110 and 8110 (i) mobile phones. It requires a 32-bit operating system, and although only Windows 95 is supported today, there's no reason why, in the future, Windows CE or EPOC-32 couldn't be; software cellular data has already been demonstrated with a Psion 5. Neatest of all are totally wireless connections using the infra-red standard on most PDAs and becoming increasingly common on new mobile phones.

Don't despair if your PDA didn't come with the comms software or web browsers you desire. If you've got one of the more popular models, chances are there's loads of stuff to download from the web itself: it may be best if you do this with your PC initially, and use that all-important connectivity kit to transfer the files.

Gordon Laing

Option International 01256 316596 www.option.com/snapon.htm
Psion www.psion.com
PalmPilot palmpilot.3com.com/

p264 ➢

Editor's Choice

The difficulty with reviewing PDAs is the sheer diversity of the products on offer. There is no one machine that does everything for everyone. Some people want touch-screens, some people don't. Some want a big keyboard, some don't want a keyboard at all. It's a controversial and intensely personal area; the palmtop you love can easily be loathed by another. There is no way of picking a single winner from the machines we tested, so consequently we are awarding Recommended awards to each of the following four products for different combinations of features, ease of use, available software and value for money.

3Com Palm Pilot Professional

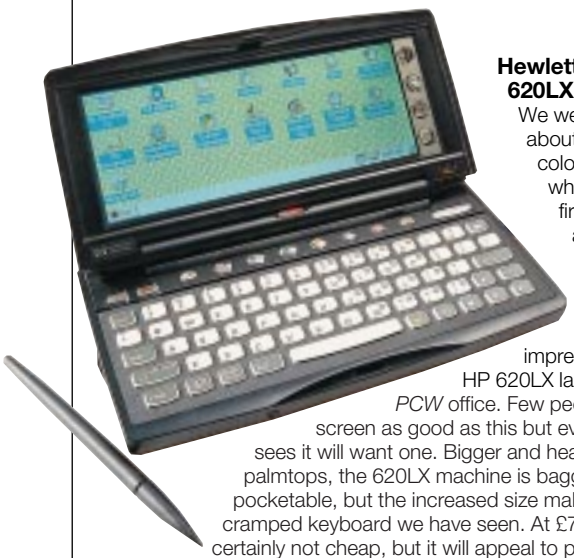
The Palm Pilot is the lightest, sleekest, smallest device around. Reasonably priced with an enormous amount of third-party software available free on the internet, it is not hard to find plenty of people willing to rave about it. The ease of use is its main selling point. The only thing you have to learn is the Graffiti characters and everybody we know has taken only minutes to master the basics. There are also lots of trendy accessories for the Palm Pilot in the way of cases and pens. For the time being it is the master of its domain, but it will be interesting to see how it stands up to the forthcoming battle with Windows CE-powered Palm PCs.

Screen	★★★★☆
Keyboard/Input	★★★★☆
Features	★★★★☆
Linking with PC	★★★★★
Comms	★★★★☆
Overall	★★★★☆

Psion Series 3c

It seems like the Psion 3c has been around for an eternity, yet despite this, its massive popularity shows no sign of waning. Compact, light and craftily designed, the Series 3c is many people's ideal solution for contacts, diary and note taking. But, as we indicated in the review, the Psion is much more than this. Many people find the spreadsheet invaluable and there are bucketfuls of free software available, from games to more serious applications. The long battery life is also a firm favourite with fans, many of whom boast several months from a single set of AAs.

Screen	★★★★☆
Keyboard/Input	★★★★★
Features	★★★★★
Linking with PC	★★★☆☆
Comms	★★★★☆
Overall	★★★★★



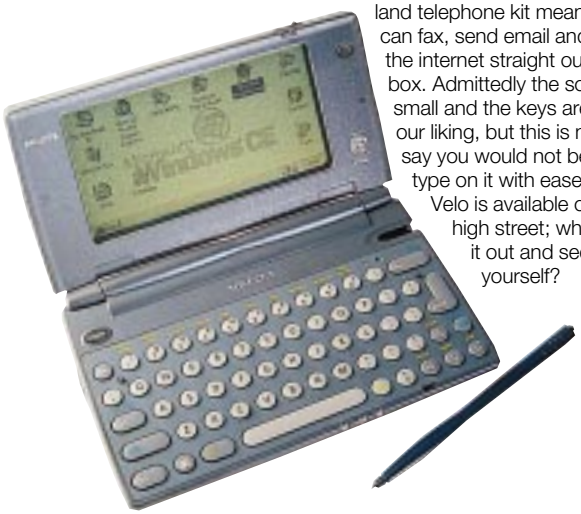
Hewlett-Packard 620LX

We were sceptical about the need for a colour screen when word was first spread about the latest Windows CE palmtops. But we were suitably impressed when the HP 620LX landed in the *PCW* office. Few people need a screen as good as this but everybody who sees it will want one. Bigger and heavier than most palmtops, the 620LX machine is baggable rather than pocketable, but the increased size makes for the least cramped keyboard we have seen. At £799 the 620LX is certainly not cheap, but it will appeal to people with thick wallets who don't mind the relatively short battery life of around five and a half hours.

Screen	★★★★★
Keyboard/Input	★★★★☆
Linking with PC	★★★★☆
Features	★★★★☆
Comms	★★★★☆
Overall	★★★★☆

Philips Velo 1

If you are searching for a Windows CE machine on a tight budget, look no further than the Velo 1 from Philips. This little machine is the best-looking palmtop around and, at £349.99, is good value for money. The software modem and supplied land telephone kit mean you can fax, send email and surf the internet straight out of the box. Admittedly the screen is small and the keys are not to our liking, but this is not to say you would not be able to type on it with ease. The Velo is available on the high street; why not try it out and see for yourself?



Screen	★★☆☆☆
Keyboard/Input	★☆☆☆☆
Linking with PC	★★★★☆
Features	★★★★★
Comms	★★★★★
Overall	★★★★☆

p266 ➢

Table of Features

Manufacturer	3Com	Apple	Casio	Compaq	Geofox	Hewlett-Packard
Model	**PalmPilot Professional**	**MessagePad 2100**	**Cassiopeia A-20E (CE 2)**	**PC Companion C120**	**Geofox One**	**360LX (CE 2)**
Price (RRP inc. VAT)	Pro £350, Personal £257	£734.38	£499.99	£233.83	£449	£599
Phone contact	0800 225252	0800 600 6010	0181 450 9131	0161 798 5588	0845 844 0109	0990 474747
Web site	www.3com.com	www.apple.com	www.casiohpc.com	www.compaq.com	www.geofox.co.uk	www.hp.com
Size (w x d x h in mm)	81 x 18 x 119	118 x 210 x 27	185 x 94 x 24.5	175 x 92 x 26	187 x 120 x 20	185 x 93 x 27
Weight (with batteries) in g	161	640	430	380	390	457
Screen size (w x h in mm)	56 x 77	83 x 129	154 x 58	115 x 57	154 x 78	154 x 58
Screen res (w x h in pixels)	160 x 160	320 x 480	640 x 240	480 x 240	640 x 320	640 x 240
No. colours / greyscales	2 greyscale	16 greyscale	4 greyscale	4 greyscale	16 greyscale	16 greyscale
Batteries required	2 x AAA	4 x AA	2 x AA	2 x AA	2 x AA	2 x AA
Quoted battery life (hrs)	50	24	25	20	25	10
Memory	1Mb (512Kb)	8Mb	8Mb	2Mb	16Mb	8Mb
Expansion slots	None	mod slot, 2 Type II PC Card	PC Card, Com Flash	PC Card	PC Card	PC Card, Com Flash
Touch-sensitive screen?	●	●	●	●	❍	●
Word processor?	❍	●	●	●	●	●
Spreadsheet?	3rd party	●	●	●	●	●
Notepad/jotter?	●	●	●	●	●	3rd party
Handwriting recognition?	● / Graffiti special chars	● Natural	3rd party	3rd party	❍	3rd party
Spell-checker?	3rd party	●	●	●	●	●
Infra-red capabilities?	❍	●	●	●	●	●
Windows PC Link?	●	●	●	●	●	●
Mains input?	❍	●	●	£29.38 extra	●	●
Tone phone dialling?	❍	●	❍	❍	●	❍
Email ability?	●	●	●	●	●	●
Web browsing ability?	3rd party	●	●	●	●	●
Audio recording?	❍	● / 8 mins per Mb	● / 3 mins per Mb	❍	● / 4 mins per Mb	● / 60 mins per Mb

Table of Features

Manufacturer	Hewlett-Packard	Nokia	Philips	Psion	Psion	Texas Instruments
Model	**620LX (CE 2)**	**9000i Communicator**	**Velo 1 (CE 1*)**	**Series 3c**	**Series 5**	**Avigo 10**
Price (RRP inc. VAT)	£799	£299 with connection	£349.99	£299.95	4Mb £399.95, 8Mb £429.95	£229
Phone contact	0990 474747	01480 434343	0800 961445	0990 143050	0990 143050	0181 230 3184
Web site	www.hp.com	www.nokia.com	www.philips.com	www.psion.com	www.psion.com	www.ti.com
Size (w x d x h in mm)	195 x 103 x 32 mm	173 x 64 x 38 mm	171 x 95 x 32 mm	165 x 85 x 22	170 x 90 x 23	83 x 140 x 19
Weight (with batteries) in g	586	397	430	275	354	198
Screen size (w x h in mm)	154 x 58	120 x 40	115 x 57	126 x 44	133 x 50 mm	51 x 76 mm
Screen res (w x h in pixels)	640 x 240	640 x 200	480 x 240	480 x 160	640 x 240	160 x 240
No. colours / greyscales	256 colour	16 greyscale	4 greyscale	4 greyscale	16 greyscale	2 greyscale
Batteries required	Rechg Lithium ion	Rechg Lithium ion	2 x AA	2 x AA	2 x AA	2 x AAA
Quoted battery life	6 hrs	3 hrs active, 35 hrs stdby	15 hrs	60 hrs	35 hrs	1 wk of normal usage
Memory	16Mb	4MB	8Mb	2Mb	4Mb/8Mb	1Mb (680Kb avail)
Expansion slots	PC Card, Com Flash	None	2 x Mini Card slots	2xSolid State disk drives	CompactFlash	None
Touch-sensitive screen?	●	❍	●	❍	●	●
Word processor?	●	❍	●	●	●	❍
Spreadsheet?	●	❍	●	●	●	❍
Notepad/jotter?	3rd party available	●	3rd party available	●	●	●
Handwriting recognition?	3rd party available	❍	3rd party available	❍	3rd party	❍
Spell-checker?	●	❍	●	●	●	❍
Infra-red capabilities?	●	●	●	❍	●	●
Windows PC Link?	●	●	●	● (extra cost)	●	●
Mains input?	●	●	●	●	●	❍
Tone phone dialling?	❍	●	Using software modem	●	●	❍
Email ability?	●	●	●	3rd Party	●	❍
Web browsing ability?	●	●	●	3rd Party	●	❍
Audio recording?	● / 60 mins per Mb	❍	● /16 mins per Mb	● /2 mins per Mb	● /4 mins per Mb	❍

● Yes ❍ No

Iris eyes are smiling

Adele Dyer looks at the identification possibilities of iris scanning. The days of the PIN could be long gone as cashpoint trials are already taking place in this country.

In an ideal world all you would have to do is to look at a cash machine and it would give you money. Sadly, banks will never be that generous, but the fantasy could be partly realised. Iris scanning could replace PIN numbers as a safer and efficient way of verifying your identity at a cashpoint and in the future you could use it for everything from collecting your email to starting your car.

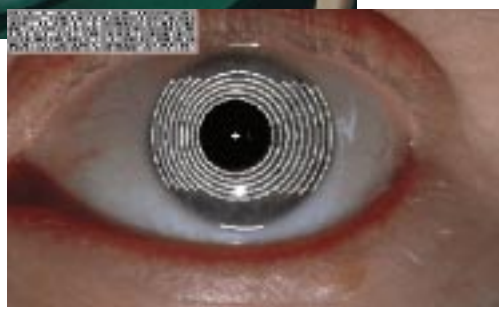
Of all the biometric systems, such as fingerprint, voice and face recognition, iris scanning is one of the more reliable ways of identifying individuals. Every iris has over 250 characteristics which make up a unique pattern. No two irises are ever alike in their details and even identical twins have different irises. Neither does your iris change over time, unlike your fingerprint or voice. Compared to fingerprints, which only have around 25 characteristics and can get scratched and scarred, it is a far more reliable way of identifying yourself.

In practice, iris scanning is relatively quick and non-intrusive. A monochrome video camera with a close-up lens takes a picture of the iris. It takes less than three seconds to capture the image which can be taken from up to a metre away. Systems should be able to cope with such circumstances as differing light conditions and users wearing spectacles and even sunglasses, although there is a problem with users wearing mirrored sunglasses. They will also be able to tell if the user is trying to defraud the system with a photograph of an iris by looking for natural contraction and dilation in the pupil.

Once it has the image, the computer scans it in much the same way it would a barcode and generates a unique identifying code, known as an IrisCode. The details are then stored on a network and can be compared to the code generated the next time the same person tries to use the system. The features of an iris can be encoded in as little as 256 bytes and codes can be compared and matched at the rate of 40,000 per second.

It may not be long before you have the chance to try it out yourself. NCR, which makes cashpoints for many of the high-street banks, has been looking at the idea for some time, and the Nationwide building society is currently running the first trial scheme in Swindon. BT has also been looking at the idea, mostly for building security.

The six-month Nationwide trial will place iris scanners on counters and on one cash machine in the branch under its head office. To use it you will have to take a few minutes to register with an initial iris scan, but after that you can choose to use the iris scanner instead of signing documents at the counter or keying-in your PIN number at the cashpoint. If the pilot scheme is successful, it could still be 18 months to two years before the technology is deployed in the high street.



NCR developed the prototype cashpoint used by Nationwide at its research laboratories in Dundee. Richard Lander of NCR says the company has been looking at various biometric systems including eye, hand, face and voice recognition, and points out that iris scanning does not suffer from the problems inherent in other biometric systems like the weather, noise and ageing.

Lander predicts it will not be the new technology itself that attracts, but the advantages it offers: "There will probably be the usual objections there are with any new technology. People feel that a little bit of their soul is being eaten up. It will make consumers more secure, but the new services that can be offered are the most important draw." New cashpoints will be able to offer everything from ordering cinema tickets to printing out share certificates and organising bank loans.

The list of uses for iris scanning goes way beyond cashpoints. It could be used with SmartCards, which have memory on-board to store personal details, to perform any number of different functions, letting you access your personal and company files from any PC, authorising access to pay-per-view TV or replacing your passport when crossing borders. You could even dispense with credit cards: your SmartCard has your bank details and your iris acts as your signature. ■

Top NCR iris-scanning machines are on trial by Nationwide Above Every iris has 250 characteristics making up a unique pattern

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Meta-physical change

Finding what you want on the overloaded, data-saturated web will get easier with the development of meta-data, "information about information". Toby Howard reports.

It's been called the Second Coming of the web. After a February 1998 announcement by the World Wide Web Consortium, the closest the web has to a governing body (www.w3.org), many web watchers have been seized with an almost religious fervour. The bad old days of an information-saturated but essentially unintelligent web are over, they say, and its saviour is "meta-data" — information about information.

Although the web is a global repository of information on a scale the world has never seen before, because the information is stored in unstructured blobs, finding what you want is hard and getting harder. Automated search engines such as those created by the excellent MetaCrawler (www.metacrawler.com) scan huge databases compiled by indexing programs which ferret around as much of the web as they can, noting which words occur in which pages. If a page happens to contain the text: "Absolutely no information whatsoever about penguins on this page", as far as a search engine is concerned, it's as valued a penguin resource as a specialised site such as The Penguin Page (www.vni.net/~kwelch/penguins/). Run a web search for "penguin" and you'll probably find both pages, but you'll also find the Pittsburgh Penguins Ice Hockey team, Penguin Books, an online club for running enthusiasts and an interactive dating agency in Utah.

If anything has been responsible for the enormous growth of the web, it's been the simplicity of its *lingua franca*, HTML. It's a small, simple and inflexible language, precisely the attributes an IT language needs for fast mass acceptance. But, as the web has developed, HTML has started to creak under the strain. The problem is that it codes the visual presentation of web documents, not their information content. Now there's a new language for the web: the Extensible Markup Language (XML) (www.w3.org/XML/).

Here's a slightly more useful version of my penguins page. In HTML, I might write:

```
There are at least
<I>seventeen</I>species of
<B>penguin</B>
```

The tags control the visual appearance of the words "seventeen" (italics) and "penguin" (bold). XML takes a quite different approach, by allowing tags that can be used to describe the data in the document. To illustrate, my penguins page in XML might look like this:

```
<penguin-bird-facts> There are at least
<penguin-species> seventeen </penguin-species>
species of penguin </penguin-bird-facts>
```

In this example the tags provide information about the information in the page. They are "meta-data". The <penguin-bird-facts> tag, for example, says that all the text between it and the matching </penguin-bird-facts> is "useful information about penguins". It's unlikely the same tags would be used in Penguin Books pages.

XML does not, of course, provide a set of tags for penguin enthusiasts. Instead, it provides a powerful mechanism for you to define any tag you like, to suit to your own purposes. You create a "document type definition" which specifies what your tags mean, and refer to this within the XML file.

As well as custom tags XML provides much greater sophistication with hyperlinks. In HTML, clicking on a hyperlink takes you direct to the appropriate web resource. In XML, links can be bi-directional, or clicking on a link might bring up a menu of related links; and links can be "transcluded" — the referred page is seamlessly inserted into the page you are reading.

But the power of XML comes at a price — discipline. Much of the HTML on the web is actually incorrect, but browsers are very tolerant. With XML, conforming browers are not permitted to ignore faulty tags and carry on as best as they can. The rule is simple: documents which contain incorrect XML code are ignored. Sceptics might be thinking: nobody will buy this, but in fact both Netscape and Microsoft argued vigorously for it. If you can browse an XML page, you can be sure it is correct. And well-formed, syntactically correct pages are essential if the web is to continue growing without falling apart.

As for meta-data being the saviour of the web, XML is providing the basis for the development of a new proposed standard called the Resource Description Framework, or RDF (www.w3.org/Metadata/). RDF is intended to provide an industry-wide standard for describing and organising web data, and promises to revolutionise web searching and navigation. Although XML is streamlined for the web, the vision is that ultimately RDF will unify all the information that comes our way: email, newsgroups, web searching, databases, and even the files on our hard disks.

When the problem of global information storage and delivery is eventually solved, we'll enjoy easy access to masses of it. The next question is: will it be any good? ■

Hands On Contents

■ *Hands On* is the place where readers can contribute to *PCW* and, as always, we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you would prefer) and we will pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.
All submissions should be emailed to the author of the appropriate column or snailmailed to Hands On, Personal Computer World Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.
We are constantly working to improve the contents of Hands On. If you have any suggestions, send them to the Editor at the address above, or email them to pcw@vnu.co.uk.

***PCW/Hands On* on CD-ROM**
Tip, trick, advice or review — if you saw it here first, you can find it again: there's a year's worth of *Hands On* columns on our monthly CD-ROM. For problem-solving or that elusive handy hint, the *PCW* cover CD has the answer.

Connection section

Mark Whitehorn continues his tutorial on client-server databases. He provides a step-by-step guide to installing an ODBC connection, letting front end communicate with back end.

We've started to consider client-server databases, with particular reference to upgrading an Access database to SQL Server. Last month we covered the installation of SQL Server, so this month we'll look at making an ODBC connection. I've already discussed the theory behind ODBC (in Hands On Databases, *PCW* March). To briefly recap: an ODBC connection allows some form of front-end program (say Access, FoxPro, C++, Visual Basic, Delphi) to communicate with a back-end database like SQL Server.

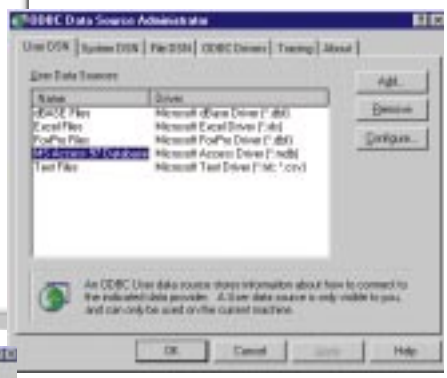
An ODBC data source is essentially a description of a potential connection which can be made between a workstation and a database on a database server. When you make use of a database from a workstation you must have an ODBC connection between the two machines, so you first create and store a description of the connection. That description details which ODBC driver to use, what it connects to, who is the default user, and so on.

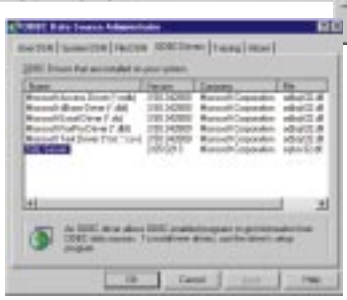
Thereafter, whenever you want to make that connection, you call up the description of it rather than have to redefine it. This description of the connection is called the ODBC data source. You can set up and configure ODBC data sources using the appropriate icon from the control panel.

Tooling up with GUI

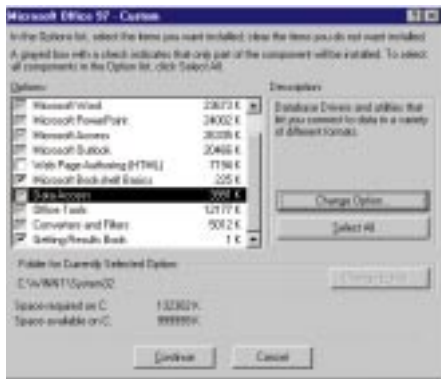
As soon as I install a new server-based RDBMS I feel that my hands are tied behind my back unless I can get a GUI-based query tool in operation. The easy way to achieve this is to make an ODBC connection to the database server from a front-end that has a GUI query tool. In addition, every user of a client-server database will also need an ODBC

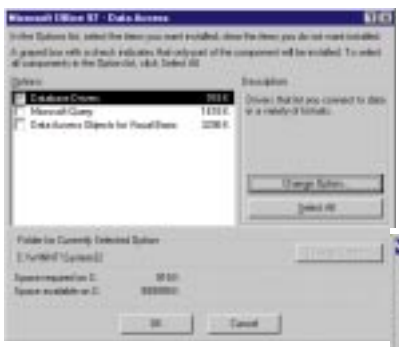
Fig 1 (left) The 32-bit ODBC in the control panel of the workstation





Figs 2 & 3 (above & left) Assuming that you make reasonable choices during the installation of Office 97, it should set up the 32-bit ODBC Data Source Administrator (DSA) as shown





Figs 4 & 5 (right & below) And this is how you can make those reasonable choices during the installation of Office

Fig 6 (right) Starting the install on the workstation from the SQL Server CD-ROM

connection from their workstation to the database server. In order to make such an ODBC connection you will need: a workstation, a server running SQL Server, a network to connect them, an ODBC Data Source Administrator on the workstation, the correct ODBC driver and the SQL Server CD-ROM.

Truck stop

To demonstrate this I started with a Windows 95 portable machine. It has never been connected to a network before and has certainly never had any truck with database servers in its long and interesting life. I have just installed Office 97 Professional and made sure that Access 97 runs OK, so let's get started.

1. Installing Office 97 added the 32-bit ODBC Data Source Administrator (DSA). The icon for this program now appears in the Control Panel (top left in Fig 1). It is worth firing up the DSA and having a look at the tabbed options (Figs 2 & 3). The options that you see here have all been set during the installation of Office, and during that installation (Figs 4 & 5) I elected to install the database drivers for SQL Server (among other packages).
2. The next step is to install the bits of software that are required, onto the workstation. Put the SQL Server CD-ROM in the drive, navigate to i386, find setup.exe and fire it up. After the excitement of the splash screen has passed, you will find that SETUP has noticed you are running the CD-ROM on a Win95 workstation (Fig 6). All it will let you do at this point is to install the necessary utilities (Fig 7) but that's fine because it's what you had in mind anyway. How many of the utilities you actually install depends on exactly who will be using the workstation and what they will do with it. It is perfectly possible to administer SQL Server from a workstation rather than directly from the server, and a system administrator may well want to do this.

In this case, since I intend to use the workstation as an administrator and disk space isn't limiting, I've plumped for the lot (Fig 8). The next screen asks about installing the SQL Server books, which I elected not to do on the workstation (it takes another 15Mb and I have the documentation on the server anyway).

3. After that, it should be plain sailing until the install finishes and you are required to reboot. After rebooting you will find that you have a set of utilities (assuming you installed

Fig 7 (left) The install program has detected that we are installing in Windows 95 and is offering the client install option

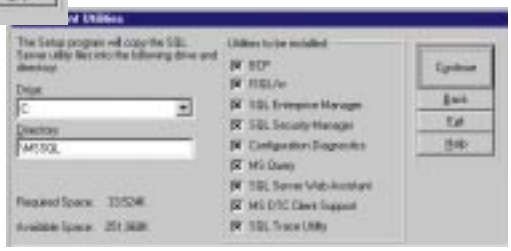


Fig 8 (right) You don't have to choose all of these options…

Fig 9 (left) …but if you intend to administer the server from the workstation, you will need at least some of them

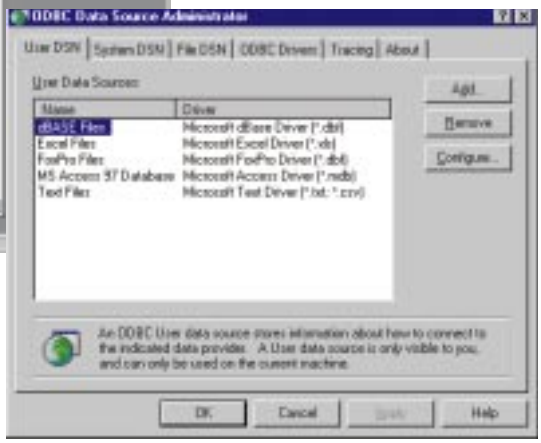


Fig 10 (right) Using the DSA to create an ODBC data source, in this case a user-specific one

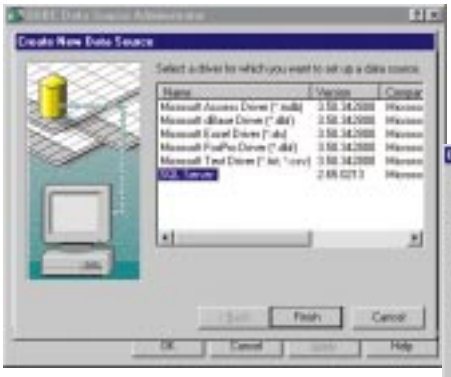


Fig 11 (left) First you need to choose the driver...

Fig 12 (right) …then tell it which server to use and, if you like, which database within that server

Fig 13 (left) Next, from within Access you can elect to link to a table via an ODBC connection

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them) and can spend some happy hours playing with them. For example, here I am (Fig 9) running Enterprise Manager from the Win95 portable.

The network connection is actually made using a PCMCIA card but I could be using dial-in from a portable phone on a train. In turn, this means that I could be administering a mission-critical client-server database from the 10:20am to Waterloo. While this is an almost terrifying thought, it seems like a much better use for a portable phone than the usual. "Gerald?… Gerald?… *GERALD!* Ah, Gerald. You're fired. *FIRED…YES*. Put me on to Barry… *BARRY!*"

4. Anyway, I digress, and we are here to make an ODBC connection, so fire up the DSA and click on the User DSN tab. As the info at the bottom of the dialog tells you, this data source will only be visible to the current user of the Win95 machine (Fig 10). A System DSN is visible to any user. Whichever you elect to use, the mechanism demonstrated here is the same.

Click on the Add button, choose SQL Server (Fig 11). Click on the Finish button and fill-in the next dialog as appropriate. Where it asks for the Server name (third box down in Fig 12) it needs the name of the SQL Server, not the NT Server. In my case, rather confusingly, these are actually the same (MW) but as long as you enter the appropriate one, all should be well.

I am going to connect to the Pubs database which is supplied with SQL Server and so I have elected to click the Options button and fill in a bit more detail, as shown. OK, finish the selections, close down the DSA and you should be ready to rock'n'roll.

5. Fire up Access, create a blank database and select File, Get External Data and Link Tables. Use the Files of type: combo box to select ODBC Databases () (Fig 13) and this dialog appears. Move to the Machine Data Source tab, select Pubs, click OK (Fig 14).

An SQL Server login dialog box should appear and you should log in as appropriate. I'm using the "sa" login (System Administrator) and that should be fine for testing purposes (Fig 15). Wow! It works! "Gerald… *GERALD!* You're reinstated."

You should now be able to see the tables and you can pick, say, "authors" (Fig16). Now follow the same route but elect to Import rather than Link Tables. If you choose authors again you can end up with two versions in the database. The linked one, as common sense suggests, is actually the one

Fig 14 (right) Choose the data source you have just created…

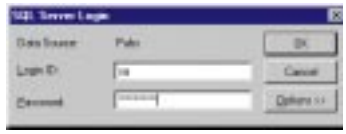

Fig 15 (above) …log in to the SQL Server…

Fig 16 …choose the table(s) you want and…

Fig 17 …you're linked. This screenshot also shows a table I have imported

Fig 18 This shows the same sort of connection being set up on an NT Server, connecting to an SQL Server running on that self-same NT Server

sitting in the server, while the other is now an Access table sitting in the MDB file. If you shut down the workstation, pretend it is another day, fire it up, open Access and the appropriate MDB file, the two tables will appear in the database window as before (Fig 17). You are free to open up the imported file, but if you try to open the linked table you'll need to log in to SQL Server before proceeding.

So, that's one of several ways of making an ODBC connection. Such a connection is essential for any users of the database but it is also a major boon to any DBA (DataBase Administrator) who wants to manipulate the data in a database. Such a DBA can connect in from a workstation, although it seems to be common practice now to actually work sitting at the NT Server. In this case, you can make an internal connection from the NT Server to the SQL Server in much the same way as illustrated here. The only major difference is that you need to select "(local)" as the server name when setting up the ODBC connection (Fig 18).

Summary and homework for next month

During the next few issues we are going to look at the planning and execution of moving an Access database up to an SQL Server-based one. Much of the grunt-work in upsizing a database in this way can be done with one of the upsizing wizards that Microsoft has written. The company makes these freely available, so we will be putting them onto our CD-ROM next month. The grunt-work involves defining the table structures in SQL Server, moving the data across and so on. However, this still leaves a fair amount of work for the human (some of which I will cover next time). In preparation, here is something that I "stole" from one of Microsoft's presentations on upsizing.

An Access database application can be thought of as layers like this:

- User Interface
- Input Validation
- Application Tasks
- Business Rules
- Data Integrity Rules
- Data Management

Some of these layers map directly onto SQL Server (the bottom three, for example). This means that when you upsize your Access application you can expect SQL Server to take over the business rules, data integrity rules and data management. You cannot expect it to take over the upper three, so they will have to stay in Access.

It is worth thinking about your Access application and trying to work out where you have implemented these layers, and what will happen if/when you split them between Access and SQL Server.

PCW Contact

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■ Mark Whitehorn's book, *Inside Relational Databases*, is available via our Reader Offers. See page 370 for details.

The **name** of the game

Memorable domain names are being snapped up fast. There are some extra top-level domains but you should act quickly to register your choice, recommends Nigel Whitfield.

Names are valuable things, and on the internet an easy-to-remember name can make the difference between your site receiving lots of visits or hardly any at all. Small wonder then that the registration of internet domain names is now big business, with many companies competing to register names for you, at surprisingly cheap prices.

There are a lot of opportunistic registrations, like the high-profile case where the Harrods name was registered by someone who tried to sell it on at a hefty premium, or the huge number of domains related to Princess Diana. Add the domains that have been registered because they might be useful in the future, and the chances of your being able to register exactly what you want are getting smaller all the time.

Partly because of that, and partly to create more competition in the registration of names, there are now some extra top-level domains where you can register sites whose name will hopefully give people a clear idea of what sort of thing they can expect when they visit: for instance, .shop, .sex and .arts are fairly self-explanatory, with the added bonus that you'll easily be able to guess that some sites, like .sex, won't be suitable for the kids.

And of course the new scheme is a lot more friendly than the old .com, .org and so forth. It will help net newcomers to find their way around much more easily. Don't believe, however, that it's going to solve all the problems you might have had with finding a domain that you want. Many domain companies are already pre-registering in time for the launch of the new domains this spring, so if you want to be sure of grabbing the right name, get your applications in now.

For many casual users, of course, a registered domain is little use without somewhere to host it, and if you're struck by what seems like a cheap deal for registration look very carefully to see exactly what it includes. Some of the best-*sounding* deals might not even include a web page, or at least nothing more than one which states: "This is a placeholder for www.mysite.com."

Yes, you can register your domain and host web pages elsewhere but, before you do, remember that there's more to having a fancy domain than just pointing an address at a web server. If you have the free space

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that's provided with many dialup accounts, you won't be able to point a new domain straight to your own space. In short, you'll need to liaise with the people who host your web site to ensure that it works with the domain that you've registered. So, if you want to join the crowd with the newest domains, shop around, and before you jump at the cheapest offer, check to find out what's really included. *Caveat emptor*.

Hack attack

Keeping track of security on systems connected to the internet can be tricky, and even the most experienced people can make the occasional slip-up that leaves systems vulnerable and open to abuse. If you're one of the growing number of people setting up a site of your own, you may not have thought of the different ways in which your computers may be attacked.

If you're running a web server and you have CGI scripts installed, they could potentially be used to cause all sorts of havoc, especially if your server runs a version of the Unix operating system. Although the vulnerabilities in web servers are well known, if you simply download or install from CD the handiest software you can find, you may well end up using something that's not up to date and which leaves your system open. One of the most common security holes is in a program called phf which is provided as a sample with some NCSA and Apache web servers. Even if you're not running one of those servers, if the program is in your /cgi-bin/ directory then your systems are still at risk.

At its simplest, this well-known hole lets people execute arbitrary commands on your server. If the actual web server is running with sufficient privileges, then the results could be disastrous. For instance, it could allow someone to access your system, breach the security and change the root password. Less obviously, even if the server is running as a user with few rights, it can still be used to mount a denial of service attack on someone else, by running the ping command against a different target, eating up your bandwidth and identifying your system, rather than the hacker's, as the source of an attack.

The simplest solution is to check your CGI directories and remove the programs you don't use by deleting them or removing the execute permissions from them. The Unix command "chmod -x phf" will stop people from being able to exploit the well-known phf security hole. Also remember to run the server as a user other than root; you can simply change the entry in its configuration file to "nouser" or "nobody" depending on which your system has defined in /etc/passwd. More details of the exploitation of CGI scripts can be found at www-archive.stanford.edu/lists/www-managers/hyper95/0597.html and the Computer Emergency Response Team, which provides information about vulnerabilities in a wide range of systems, is at www.cert.org. Even if you think your system is secure, it pays to double-check: to protect your data and to ensure that your system cannot be used by a third-party to attack others.

Questions & Answers

Q I know this may sound like a very basic question, but how do I access ftp sites using Netscape Navigator without using another app? I've tried everything I know but cannot directly access these sites, which is a pain, as some www sites such as uploaded.com have a direct link to an ftp site for downloads.

A The simplest way to access an ftp server is simply by turning the details of the server into a URL and typing that into your web browser. For instance, if you wanted to access the /pub/ibmpc directory on ftp.demon.co.uk, then the full URL that you'll need to give the browser is ftp.demon.co.uk/pub/ibmpc

If you're still having problems, there are a number of things you can look at. First, check the preferences of your browser to make sure that it has your email address properly configured (Fig 1). In Navigator 4, the Advanced preferences option has a checkbox for sending your email address as a password. This should be checked to ensure that you can access those sites that insist on knowing it.

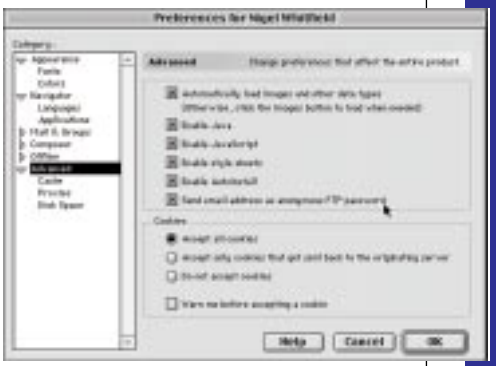

Fig 1 Make sure that you configure your web browser to send your email address when you ftp

It's also worth making sure that your ISP provides what's called "reverse

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lookup" which is the way in which incoming connections to many ftp servers are verified. If a reverse lookup can't be carried out, you may be refused access.

Finally, if you have problems downloading files, use the right mouse button (or a long click for Mac users) to select a file and choose to save it to disk. If the file has an unusual extension your browser may become confused about what to do with it otherwise, and it's best to say that you want the data saved to a file.

Q I am using an AOL free trial at the moment and I want to use other programs such as Pegasus Mail and mIRC, but I have to load the AOL program and sign on first and this takes a long time on a 486 with 4Mb of RAM. I have seen other people just launch whatever program and use it, but I can't. It is beginning to get annoying as the web, ftp and email facilities take an extremely long time to load, whereas WS_FTP, Internet Explorer and Pegasus Mail launch in seconds. Any suggestions?

A The reason other people can launch whatever application they want and use it directly is that they're not using AOL. Although you can access the internet via AOL, it's not actually a true net connection in the strict sense of the word since the link between you and AOL uses their own proprietary protocol rather than TCP/IP.

This means that you have to sign on to AOL and then use its special version of Winsock, which sends information over its network and out onto the internet. Since the connection to AOL is handled via the AOL software, you can't opt not to load it.

By contrast, a connection to a more standard ISP is a straightforward TCP/IP link using the Point-to-Point Protocol, which is the way in which internet information is sent over the modem link. Support for this is built into Windows 95, which can also detect when you're trying to access a site on the net and automatically make the connection using the DialUp Networking facility, without you having to launch any special programs. Windows 3.1 users can use software like Trumpet Winsock, which will do the same thing. If you have Trumpet in your startup group, then you'll be able to connect automatically in much the same way as a Win95 user.

If you only have four megabytes of memory, you'll almost certainly receive better results by using a standard ISP since there'll be less to clutter up the memory in your machine. But bear in mind that you'll also continue to suffer from speed problems, especially on graphically-intensive web pages where you may find the browser running out of memory. If you want to persevere with the internet after your free trial, then you should seriously consider upgrading your computer with more memory.

Q I use AOL in the US and I've heard lots of stuff about email signatures. Could you please tell me, how do you change that file under AOL?

Also, is there a way to get *Personal Computer World* articles online? For example, is there a mailing list to which I can send my email address and automatically receive articles via email? I'm asking this because I cannot seem to find a copy of *PCW* where I live, and I badly miss your magazine.

A There's no direct support on AOL for signatures on your email messages, although you can add one to postings that you make to newsgroups: to access this, go to keyword NEWSGROUPS and click on the Set Preferences button; you can enter a signature in the box that appears below (Fig 2). Remember that you should try to keep it as brief as possible.

If you want to add a signature to your email messages you have two solutions. One is to compose messages with a text editor or word processor that has an "automatic text" feature and then paste them into AOL's Compose Message window. The alternative is to download Power Tools for AOL, which will allow you to add signatures to your messages more easily.

Fig 2 AOL only supports signatures on newsgroup messages, not email

Thanks for your kind words about *PCW*. You can't read the whole thing online but it is possible to access some parts of it. You can visit our VNU web site at www.vnu.co.uk and if you're on AOL you'll also be able to find the magazine there, by using the keyword PCW. ➢

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If you cannot access that keyword directly from the American section of the service, choose International, then the UK main menu and from there click on the Computing icon. You'll find *PCW* among the other British computer mags online.

Q Every time I try to use any of my internet applications I get a message stating: "An essential file is missing, please re-install dialup networking". The thing is, I have re-installed dialup many times. I even got to the point of re-installing Windows 95 and that had no effect on the problem. The only internet I can use is AOL.

A Your problems are most likely caused by having installed AOL or some similar software that provides access to the internet. As we mentioned in a previous answer (*p292*) some internet services rely on their own version of Winsock.dll and if that's put into the Windows directory it can cause problems with using DialUp Networking.

The best solution is to remove all files that are not part of Windows: remove the TCP/IP protocol from the networking control panel, if it's already present, then delete any winsock.dll and wsock32.dll files from your Windows directories (Fig 3). You can then add TCP/IP again via the network control panel and the correct versions of Winsock will be restored from the CD-ROM or floppy disks. If you still have problems, then it may be worth considering a new install of Windows.

If you wish to continue using AOL make sure you're using the latest 32-bit version rather than the 16-bit versions that some Windows 95 users have. You can go to keyword UPGRADE to download a new version, which will coexist more happily.

Since you have a connection to an ISP you can also use that to connect to AOL rather than dialling into its own numbers. The performance may not be as good, but you may find it simpler to restrict the number of programs with a Winsock.dll on your system to prevent such problems in the future.

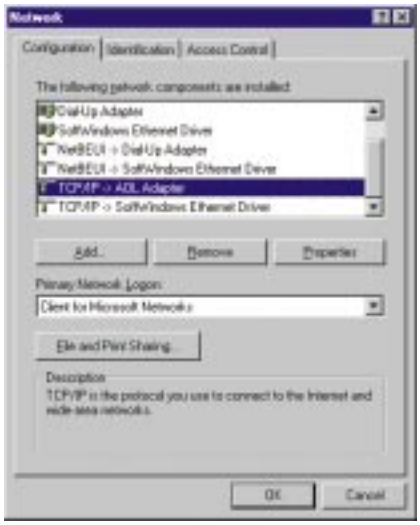


Fig 3 Remove the TCP/IP protocol and Winsock files if you think they've been overwritten by software such as AOL

Q I've heard people on the internet talk about "Denial of Service" attacks. What are these, and how can I protect myself against them?

A A Denial of Service attack is a name for a specific class of attack on a computer system. Its intention is to make it difficult or impossible to use either the computer or its net connection, and it can take many different forms.

For instance, some people choose to mount this type of attack using the ping command, to send lots of data to a remote system on the internet. Some computers cannot cope with certain attacks made in this way and will simply crash, while in other cases the net connection becomes so overwhelmed with the amount of information that it's effectively useless for anything else.

Another type of attack is "mailbombing", where lots of messages are sent to a particular system with the intention of filling up the disk space and preventing legitimate messages from being received. You could unwittingly become part of such an attack by responding to what appears to be a piece of junk mail from an address; it's not unknown for people to forge messages in the hope that all the angry replies will overwhelm their true target's mail system.

The bad news is that because there are so many different types of Denial of Service attack, there's little that can be done to prevent them, although a system with security loopholes is obviously more vulnerable. As a dialup user, if someone wants to overwhelm your connection with lots of pings, there is very little you can do about it.

PCW Contact

Nigel Whitfield is a freelance journalist, maintainer of several internet mailing lists and consultant to a number of non-profit organisations. Write to him via the *PCW* address (p10) or contact him at internet@pcw.co.uk

We'll **meet again**

The recent documents list is often a bit wayward but Tim Nott has the answer to a couple of mysteries: controlling what goes into the list in the first place, and why 16-bit apps are choosy.

The Recent Documents list has been a long-standing favourite in this column, with tips on how to get at it, how to clear it automatically and how to clear it selectively, cropping up at irregular intervals. A mystery I don't think we've cracked is why sometimes 16-bit apps store recently-opened documents here, while at other times they don't.

The answer is that it depends on how you open them. Sixteen-bit (designed for Windows 3.1) applications don't record Recent Documents from their File Open or Save dialogs. However, if you open a document by double-clicking in Explorer, to launch both it and its parent application, then Explorer will record it.

The other problem we've never been able to crack is controlling what goes into the list in the first place. Enter Recent Documents 97, from Oakley Data Services. Here you can control both the size of the list and the age of files before they drop off it: you're not limited to the default maximum of 15 and you can "lock" documents so they never fall off. That, however, is just the start, as you have various ways of viewing the files, grouped by date, folder, type, user-defined category or all in together.

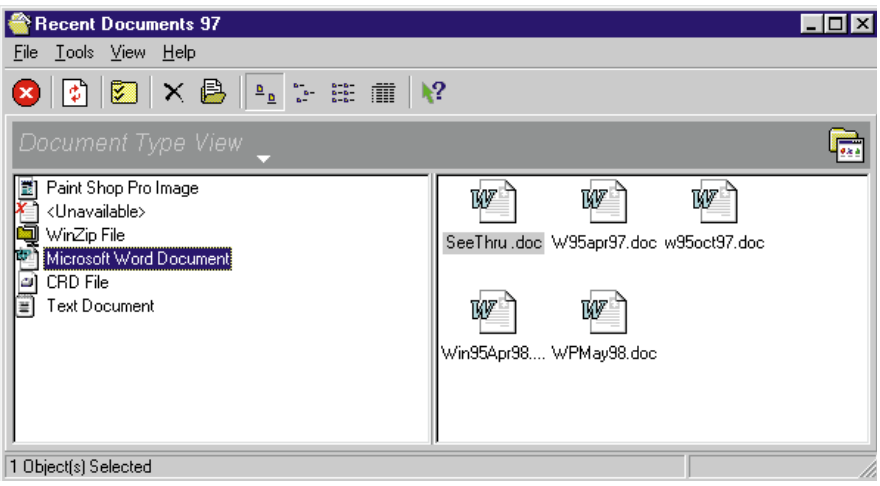
Then it gets more clever, and more complicated, with rules. Rules are created in a simple (*ho-ho!*) Unix-style syntax and can be used to include specific filetypes or documents whose name contains a specified string of characters, exclude them or move them to a certain category.

Each category, by the way, can have its own size and date limits. For PCs with multiple profiles, each user has his or her own set of documents, categories and rules. The only disadvantage I can find is that it takes longer to open the Recent Documents folder than it does to display the standard Windows menu-style list.

The trial version is on our cover-mounted CD-ROM this month or is available from www.smartcode.com.

Fig 1 Four new shortcuts

```
"c:\paint shop\psp.exe" /browse c:\windows\tempor~1\cache1
"c:\paint shop\psp.exe" /browse c:\windows\tempor~1\cache2
"c:\paint shop\psp.exe" /browse c:\windows\tempor~1\cache3
"c:\paint shop\psp.exe" /browse c:\windows\tempor~1\cache4
```



Recent Documents as never before: shareware from UK-based Oakley

Checking the cache

Paint Shop Pro is such a popular piece of software that I make no apologies for passing on hints and tips about it. In last May's column, which should still be on the *PCW* CD-ROM, I passed on Tim Bailey's tip for adding Browse Pictures as a right-click option for folders. Chris Gil has been pondering a way to make this work with Internet Explorer's cache.

As we've noted before, with IE3, the actual files are located in four hidden subfolders which can't be seen in Explorer or PSP's file dialog, but they do show up in File Manager. So, the Browse command cannot find them either directly or by using Tim Bailey's trick. Chris' answer was to create four new shortcuts in Paint Shop's Start Menu folder, as in Fig 1. If you don't keep PSP.EXE in c:\paint shop you need to modify the path accordingly.

Having written that, I then tried it on a machine with IE4 and a beta build of Windows 98. It doesn't work, because the individual cache folders had new, exciting names like "ugbdode5". So I modified the shortcuts to suit, and it worked. Having written *that*, I found that although Paint Shop's browser open dialog still couldn't find these folders, Explorer now could (Fig 2), and the right-click Browse Pictures trick now worked… *Doh!*

Fig 2 **At last, it can be done! See what images Internet Explorer has squirreled away**

Keyboard quickie

Here's a keyboard quickie, from Hugh Lacey, in response to the tip of creating shortcuts to hop straight to a specific page of a Control Panel property sheet.

This one's specifically for Device Manager. If you have a Windows key, press that, and the Pause/Break key that doesn't seem to do much beside keep the equally-useless Scroll Lock key company and stop DOS batch files running. You should see the System Properties panel leap to the fore.

Now here's the bit that has taken me three years to realise. The arrow keys switch pages in tabbed dialogs or property boxes. So a quick jab at the right arrow button gets you to System Properties.

Ciao, wow!

Bob Monroe, of Perugia in Italy, had an exciting new problem. He noticed that Help no longer worked in any program, nor from the Start menu. If he double-clicked a help file in Explorer it obligingly sprang to life, but from applications the disk went chunter, chunter, then nothing.

The same thing happened with the little question mark in the top corner of dialog boxes. Then he bought Encarta 98 and it wouldn't play the videos, putting up a pathetic note stating: "Cannot find vids.iv32 decompressor". However, once again, if he double-clicked on the .AVI files on the CD, they played perfectly. So, in Bob's words: "*It looks like the knitting at the centre of Win95 has become a bit unravelled. Any ideas?*" Quick as a flash, I was able to reply: "None whatsoever."

Fortunately, Bob tracked down the problem to a missing .DLL with the aid of "Norton Something-or-Other".

"*The file has the ridiculous name of WOW32.DLL, and though only 4K it seems to keep all the bits talking to each other. A quick extraction from win95_11.cab on the Windows 95 installation CD solved both problems.*"

Stop start

Another tip from the indefatigable Peter McGarvey. He's not getting a book token this time as he'll only squander it on some programming tome and anyway it's only a little tip, and one for spoilsports at that. "*If you want to stop 'Restart in MS-DOS mode' option from working, there is a PIF file called Exit to DOS in the Win95 folder which is called up whenever you select 'Restart in MS-DOS mode' from the shutdown box. By altering the properties of this PIF to run a batch file with nothing but an EXIT command, the MS-DOS mode option does not work. I know there is a system policy option to disable all DOS apps which has the same effect, but I needed a way to run a DOS batch file each time someone logged on.*"

A find tip you've got me into…

Here's yet another Find tip. Last month we made the amazing discovery that you don't necessarily have to type asterisks or question marks to do a wildcard search: typing ABC into the space will find any file whose name or extension contains that text. You can use the symbols if you want to narrow the search down: ABC*.* will only find files that start with those letters.

This month's tip is equally revealing: leaving a space in the filename field finds multiple patterns, so ABC DEF will find all files containing ABC or DEF in their names. This same trick doesn't work in the Containing text field; if you type more than one word it will look for the phrase. Don't put quotes around a phrase, by the way, unless the text for which you are searching also has quotes around it.

Dept. of obscure tips

If you have IE4 installed and don't feel your Active Desktop is active enough, try this wonderfully daft tip from Marc Ball, who writes: "Want to *really* slow down your system? Yeah, course you do! First, install IE4. Next, catch yourself a good animated gif from the web. Then set your Desktop to Web Page view and finally set the moving gif as your wallpaper, preferably tiled. *Voilà!* Instant PC treacle. I really ought to get out more!…"

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Questions & Answers

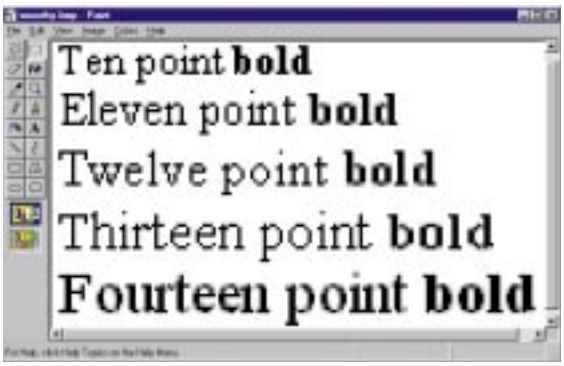
Q In January's column you mentioned a file (W95GRAY.EXE) which could be downloaded from the Microsoft web site, free, and which added font smoothing and other goodies to Windows 95 display settings. I can't find it anywhere, searching the MS web site.

Gerri Bulger

A Quite a few readers have had the same problem — it seems to move around a bit. At the time of writing, the file can definitely be found at www.microsoft.com/typography/free.htm. Failing that, a web search on the filename will turn it up at a variety of other sites.

Q Considering the font smoother only appears to use four-or-so greyscales to smooth the font anyway, why doesn't it work in 256-colour mode? I'm using a very basic video card and it doesn't perform very well at 16-bit colour modes. Secondly, is there a way to get it to work for small letters? The smoothing only seems to kick in at about 14pt and by then you don't usually need it as much, which makes it seem a bit pointless.

Cyke O'Path



Font smoothing in action — a magnified view

A Nice name, tricky question. Although the documentation claims that the font smoother works in 256 colours or higher, it doesn't work for me, either, at that colour depth. I suspect this may just be a case of mis-documentation. With regard to it not working at small sizes, what the smoothing does is interpolate various shades of grey alongside the existing black pixels. At around 13pt or smaller (a bit less for bold) there just aren't enough pixels to play with. You'd end up with a smeary-looking mess.

Q I have been having terrible trouble getting my Dell PII to fax and connect to the net without a great deal of coaxing. Every time I boot into Windows a notepad window opens, titled Ndislog. I have no idea what this is about. I was wondering whether you have an idea as to what is going on, and how I can get rid of it?

Simon Nicholson

A NDISLOG.TXT is a log file created when you start Windows. Normally it doesn't contain anything, but if errors arise loading real-mode network drivers, then they will be recorded in this file and shown on startup.

Without looking at the file it's impossible to be sure of the cause but likely candidates are real-mode network drivers loading in autoexec.bat. If you have a line reading Net Start, REM it out. This could also be responsible for the other problems to which you allude.

Q In DOS Prompt (in Windows Mode) why is it that when I type cd progra~1, or cd mydocu~1, the prompt says C:\Program Files\> or C:\My Documents>?

Nick Lee

A It is just being accommodating.

You can see both the short name and the long name from the DOS DIR command, but old 16-bit applications (e.g. File Manager) will only show the shortened version. Typing the long version inside double quotes (cd "Program Files") also works.

Q In your December '97 column you described how to create icons in Windows Paint. My problem is that VB 5.0 Pro refuses to believe that they are icons and displays a dialog box stating "Invalid property value". Why?

Andrew Rendle

A It's because they are not real icons. They are .BMP files rather than true .ICO files. Windows has the mechanism to display them as if they *were* icons but Visual Basic is more stringent and does not have this ability.

Q While playing DOS-based full-screen games, if the window key is pressed the start menu pops up and the game crashes. Is there any way to disable the window key action while running these DOS applications? The DOS property sheets that accompany each program shortcut let you disable other Win95 hotkeys, but why is the Window key not listed among them?

Mike Box

A Indeed, on the Misc page of the DOS shortcut (PIF) property sheet there are options for disabling various key combinations as well as the screensaver, so I think the answer to your second question is just that someone forgot. The answer to the first question is to run the game in MS-DOS mode, but you'll need to load whatever drivers and settings your CD-ROM drive, sound card, mouse and joystick need for real-mode operation.

Q When I go to change the system date/time in Windows, the months are displayed in French! The regional settings and keyboard settings are set up for English/British as far as I can tell.

Andi Hames

A Are you sure of the settings? The only way I can reproduce this is by going to Control Panel/Regional Settings and changing the language that appears above the map in the first, Regional Settings, tab. It should be English (United Kingdom), if you want British settings.

Q Is there a way I can change the Windows settings to show British spelling in "Color" and "Favorites"?

Peter Dantry

A Although you can rename, say, the Favorites folder, this won't affect menu items, toolbar captions, dialog boxes or Tooltips. Console yourself with the thought that Wordsworth, Byron and Longfellow used "favorite" and Shakespeare used "colour" and "color" at random. In his day, spell-checking meant verifying you had the toe of newt and eye of frog in the right proportions.

PCW Contact

Email **Tim Nott** at win95@pcw.co.uk or write to him c/o the usual *PCW* postal address (p10).

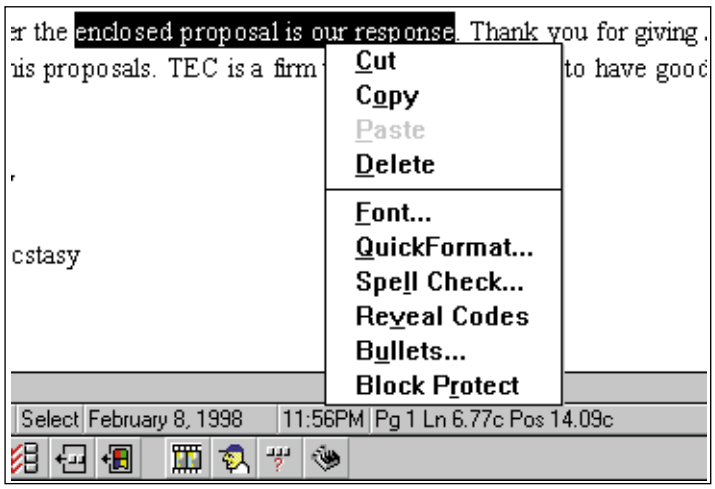
Copy cats

Panicos Georghiades and Gabriel Jacobs round off a triple dose of DOS under Windows magic with hints and tips, including the copying of data. Plus, a look at a new Corel suite.

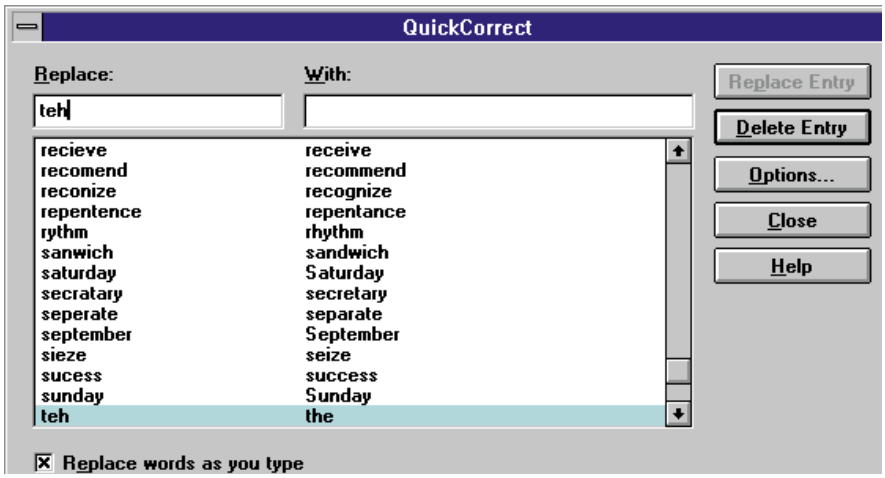
As well as answering a selection of your queries this month, we conclude our three-part mini-series on how to set up Windows to run DOS programs. And, you should check out some classic DOS games on our cover-mounted CD-ROM. We also take a look at an interesting brand-new release from Corel, for Windows 3.1.

We have examined the various settings in the PIF editor previously, so we will conclude with some hints and tips. It is handy to create multiple PIF files for your applications with different settings, depending on how you want to use them at certain times. You can use different start-up directories, say, where you keep different sets of data, or different memory and video settings. Or you may decide to have windowed versions you can copy from, and full-screen versions for faster work.

And while we are on the subject of editing settings, remember that it's so easy to use the Save command when you really mean Save As (that is, the new settings). So use the Save As command as soon as you start editing a file, before your mind gets too involved in what settings you should use!



The new Windows 3.1 version of WordPerfect has right mouse support and QuickCorrect features



Copying data

One of the advantages of running DOS programs under Windows is the ability to copy data to and from other applications.

The crudest method is available when you run DOS applications full-screen, either in Standard or 386 Enhanced mode. All you are allowed to do is dump the complete screen to the Clipboard by pressing PrtScr (on some PCs you might need to use Alt-PrtScr or Shift-PrtScr). You can then paste this to any other Windows application using Edit, and Paste. When you copy this way, the screen is copied as graphics.

A more flexible way becomes available when you run DOS programs windowed. From the DOS program's Control menu you select Edit, and Mark. You move the mouse inside the program's window and click and drag to select the area you want to copy. Next, you go back to the Control menu and select Edit, and Copy. This copies the selected area to the Clipboard. Finally, you can paste this into another application. In this way you can copy text or numbers. But you can't copy data back into a DOS application which is running full screen.

Pasting into another DOS program, or into the same DOS program in a different position (essentially a Move operation) can only be done when the program is running in a window, and therefore only when running Windows in 386 Enhanced mode.

Questions & Answers

Q I am using Windows 95 and a friend of mine is using Windows 3.1. He finds the startup logo of Windows 3.1 really annoying. Can we really change that logo to another, more meaningful one?

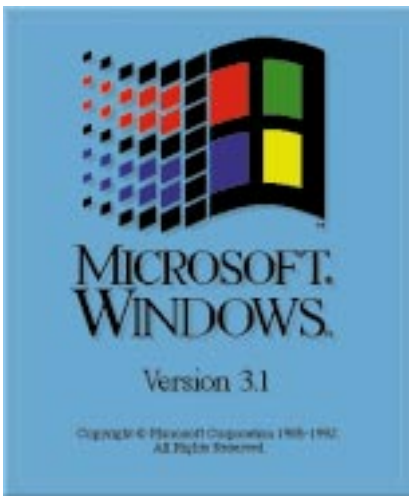
Chan Hoi Ching
h_c_chan@usa.net

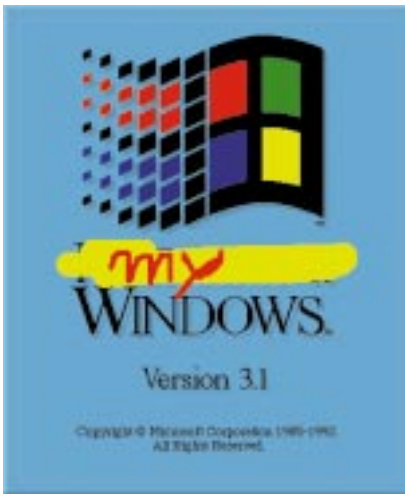
A Yes, it is possible to change the startup logo, but it is not a straightforward matter and we do not recommend it.

In the Windows\System sub-directory you will find a file named Vgalogo.rle which contains the default image. This gets embedded in another file called Win.com (in the Windows directory) when you set up your VGA card. You can edit Vgalogo.rle or create one of your own. You will need image-editing or paint software that can save to RLE (Run Length Encoding) format.

To avoid unpredictable results, use the same image attributes as those of the original file: 355 x 425 pixels and 16 colours. The file size of the original is around 27Kb. If your new file is much larger, Windows may not start, so it's an idea to make copies of your original Win.com (and the Vgalogo.rle) before you start.

After you have replaced the original Vgalogo.rle with yours, you then need to change the setting of your graphics card to the standard VGA setting and back again to the resolution at which you usually work, so that the new image will be embedded in Win.com.





You select Edit and Paste from the program's Control menu.

When copying aligned text from a DOS program into a Windows application, you might find that the alignment is lost due to the use of a proportionally-spaced font (for instance, Times Roman) by the Windows application. In this case, you have two choices: either insert tabs to re-align the text, or change to a non-proportional font like Courier.

DOS and the mouse

If your DOS program does not run with the mouse driver installed for Windows, and requires you to run a mouse.com, mouse.exe or similar driver, you need to ensure that the relevant mouse driver is loaded before the DOS program itself. This is best done by creating a little batch file which you use as the executable program in the PIF file (do not run the mouse driver program before you start Windows). Here's an example batch file:

```
cd\utils
mouse.com
cd\apps
dosapp.exe
```

While you are in Edit, Mark mode, mouse control is temporarily taken away from the DOS application and given to Windows, until you have selected an area to copy.

Running TSRs

Any Terminate and Stay Resident (TSR) program run before you start Windows will be made available to all DOS applications running under Windows. However, not only

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Questions & Answers (cont'd)

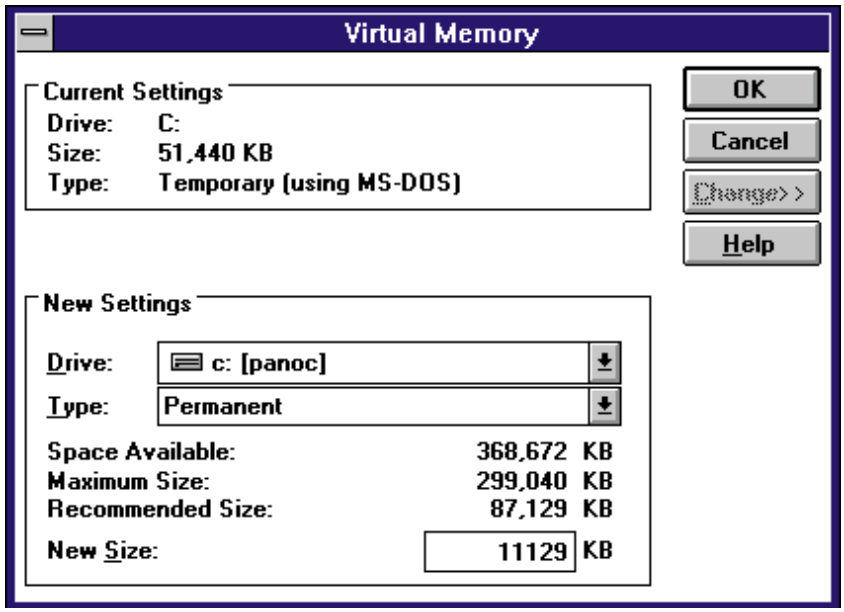
Q I have a Toshiba notebook with a 350Mb hard disk, so space may well become a problem. In the C root directory there is an enormous file of 11,976,704 bytes labelled 386spart.par. It has an exclamation mark on the file icon. What does this file do? Is it essential? I'd be most grateful for your advice.

Robert Newmark
rownew@compuserve.com

A This hidden system file (hence the exclamation mark) is your Windows permanent swap file, where Windows does its temporary work. The official advice is that you should never attempt to delete it yourself, although we once deleted it accidentally and, when it was automatically recreated, the deletion seemed to have had little effect. Anyway, it's far better not to.

If you need to make this file smaller, you should use the Control Panel's 386 Enhanced icon (click on the Virtual Memory button) to change the setting, either to a smaller value or to a temporary swap file. Permanent swap files use up the space allocated to them even when you are not running Windows, while temporary swap files use the space only during a Windows session and clear it when you exit Windows. Permanent swap files are said to give a faster performance.

Our experience is that they make little difference but we haven't tested this out on a large range of machines. The choice is yours.



Use the 386 icon in the Control Panel if you wish to change the settings of your swap file

might there be conflicts between the TSR program and Windows, but also TSR programs run in this way will take up valuable memory from other DOS applications running under Windows which do not need them. On top of that, they will also slow Windows down.

The best solution depends on the nature of the TSR. If it provides support for a particular DOS program, simply create a batch file which brings the two together on the lines of the batch file suggested above for a mouse driver. If the TSR program acts in a standalone way, create a PIF file for it, install it like any other DOS application, and let Windows multitask it.

Note that you should avoid using hot-key combinations to initiate TSRs. If you have to, make sure they do not conflict with any Windows key combinations.

Corel WordPerfect

We have had the chance recently to take a look at a brand-new and very interesting release from Corel, specifically for the Windows 3.1 market.

Yes, it's three years since the release of Windows 95, and Windows 98 is on the horizon, but judging from the number of letters we receive from readers it seems there are still many people out there who prefer Windows 3.1. And it is hardly news that Windows 3.1 users have been ignored for the last three years because every major software release has been for Windows 95.

Well, Corel has spotted a market in those ignored users and has just updated its WordPerfect-based Office Suite for them. This version of the WordPerfect Suite not only adds functionality available in the Windows 95 version (apart from features related to the operating system) but also contains one of the richest arrays of programs you will find in any office suite. And with competitive software not having been upgraded, it is certainly now the best choice on the market.

Just listing the known names of programs contained in it can make your mouth water, and if you add up their individual prices (easily over £600) it has to be a good deal.

You get WordPerfect 7 (word processor), Quattro Pro 7 (spreadsheet), Paradox 7 (database), Corel Presentations 7 (presentation software), 10,000 clipart images, and 1,000 fonts and 200 photos. You also get CorelFlow (flowcharting program), Time Line (project management and scheduling), the Corel Address Book, a rhyming dictionary, the American Heritage Concise Dictionary, Sidekick 2.0 (personal organiser) and Dashboard 3.0 (a task automation launcher). Since one of the main features of this release is integration with the internet, you get Netscape Navigator and Envoy (a workgroup and net electronic publishing tool).

Some of the functions which have been upgraded are internet connectivity, Spell-as-You-Go, Format-As-You-Go, support for new file formats, right mouse button support and other similar stuff.

Could this be the first of some new major releases for Windows 3.1? Other software producers will no doubt be carefully watching how Corel's product fares — and we will keep you up to date on the latest developments.

PCW Contacts

If you have any queries or Win3.1-related topics to discuss, contact **Panicos Georghiades** and **Gabriel Jacobs** at win3.1@pcw.co.uk

Cleaning up your act

Or, to be precise, your Registry. The new RegClean hunts out any faulty entries for fixing or deleting. It's not foolproof though, says Andrew Ward, so take care when you use it.

A few readers have asked where they can find the RegZap program I mentioned in the March issue. Ah, well… It was actually on the cover disc. My fault for not saying so within the article itself. If you missed that issue it's also available from CIX, if you have a CIX account, at cixfile:windows/files_32:regzap.zip.

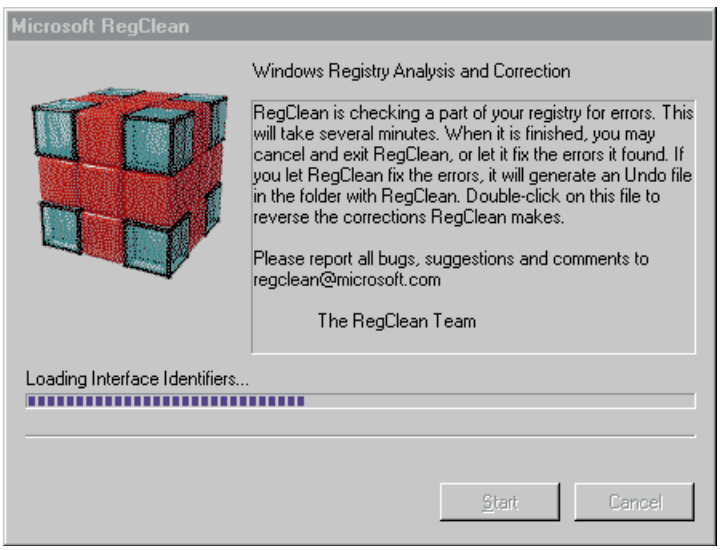
This month there is another treat for you. A new version of Microsoft's registry cleanup program, RegClean, which (finally) works with Windows NT 4 Service Pack 3. Called RegClean 4.1a (build 7364.1) it was released by Microsoft on 30th December 1997. It's on our cover disc, and you can also get it from CIX at cixfile:windows/files_32:regcln41a.zip.

RegClean runs in only a few seconds on my machine but Microsoft warns that it could take up to 30 minutes to complete its working. Unfortunately, unlike RegZap, RegClean doesn't tell you what errors have been found nor give you a chance to select those you'd like fixed; it just fixes everything (or not) — you can always press cancel. But what it does do is to create an undo file, so if something goes awry after running RegClean you can always restore the previous situation. This is just as well, because Microsoft confesses that on rare occasions RegClean will actually cause more problems than it solves.

Remember that neither RegZap nor RegClean can fix a corrupt registry: all they can do is to remove faulty entries from a working registry. And both programs need to be run more than once until they no longer report any errors.

RegClean should now work with Microsoft Windows NT 3.51 (with Service Pack 3 or later), Microsoft Windows NT 4.0 and Microsoft Windows 95, and with NT 5.0 and Windows 98 as far as I can tell.

There are problems you might encounter when trying RegClean. If you get the error message "REGCLEAN.EXE is linked to missing export OLEAUT32.DLL:421" then run the file OADIST.EXE that came with RegClean (if you are using NT 4.0 or Windows 95). Otherwise, check the read-me file for instructions.



Cleaning out dodgy registry entries the Microsoft way

Even faster web browsing

A while ago I suggested using a local cacheing-only DNS server in order to speed up web browsing, by saving on the number of DNS lookups that have to take place across the link to your ISP. A problem with this method is that the cache is not persistent across reboots. Paul Kane has written in to put forward an alternative method of achieving the same ends.

Before the Domain Name System ever existed, you had to set up mapping between host names and IP addresses manually, in a file called HOSTS. This file is still actually scanned today even though, of course, it isn't usually populated; a DNS server is used instead. But you can populate it yourself manually, for example, with an entry like this:

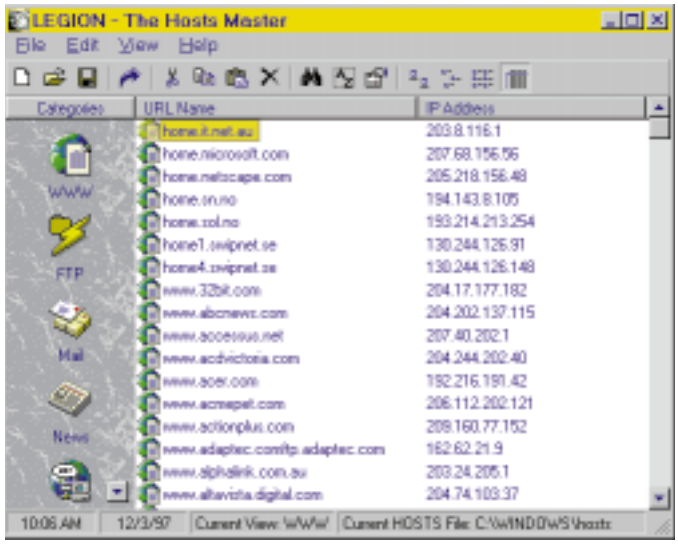
```
194.72.64.86    www .pcw.co.uk
```

In future, when you type www.pcw.co.uk into your web browser it will fetch the IP immediately from the local hosts file instead of forcing a DNS lookup.

There are two obvious problems with this. One is that it's a pain to have to create these entries yourself: clearly, any potential timesaving by avoiding the need for DNS lookups will be wiped out by the pain of manually setting up the file. Secondly, what if someone's IP address changes?

Fortunately there's an answer to the first problem, contained in the file LGN111.EXE on this month's cover disc. Legion — The Hosts Master will look up the IP address for a given URL and place it in the file for you. In fact, it will go one better than that. You

p308 ➢



A natty program to maintain your local HOSTS file

can get it to trawl through a URL database (such as the Microsoft Internet Explorer favourites folder) and look up all the IP addresses automatically.

It needs to carry out this exercise online, of course, but it's a hands-free process and consumes very little CPU effort so you can get on with something else for the few minutes it takes (just how long that is depends, I suppose, on the number of bookmarks you've saved).

You'll have to work out for yourself whether, or when, you need to repeat the process depending on how often you add new bookmarks and how much you use them. You can also import the Legion defaults: these populate the HOSTS file with a few commonly-used values that could come in handy.

But really, I've gone off the idea of these various speed-ups. After all, isn't the whole point of the new networked computing paradigm that we offload complexity from our own machines to network services looked after by someone else? So why load up your hard drive, memory and processor with software that you need to install, configure and maintain, to duplicate a function that is already being quite happily executed by your ISP's DNS server? The additional time invested surely cannot be justified by the saving of the odd half-second here and there on DNS lookups (but remember that a DNS lookup is performed for every single page when you're web-browsing).

Nevertheless, I am giving Legion a try. I've imported all my IE4 favourites and have added the addresses of the mail servers I use most often. But after a few days I'm not sure that it makes enough of a difference to notice. It could just be that my ISP's DNS servers are nice and fast, and that having an ISDN line makes a difference, too. The documentation for Legion talks about having to wait seconds for DNS lookups, but that's certainly not the case with BT Internet.

Setting the folder used for print spool files

Printer folder

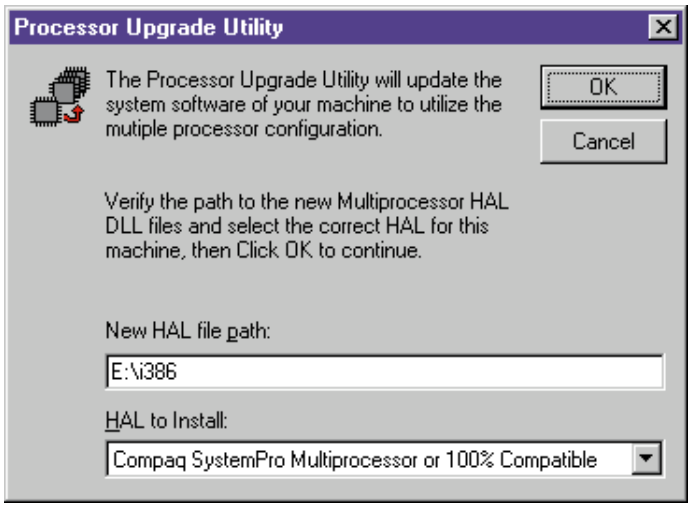
John Howells quite rightly points out that fiddling with the registry is to be avoided whenever possible, and explains how the location of the print spool folder can be modified without registry manipulation.

Open up the printer folder, select File/Server Properties, and then under the Advanced tab you can change the entry in the Spool Folder text box. There's no Browse button so you're on your own with typing mistakes. Thanks to John for that tip.

Double the trouble

Andrew Butler writes in to observe that the price of multiprocessor motherboards has fallen quite dramatically. But he very sensibly wants to know whether there's any point in having more than one processor: will Windows NT support it, and will programs run any faster?

p312 ➢



Upgrading to a multiprocessor system made easier

Windows NT certainly does support multiple processors and from version 4.0 onwards, four-processor support is included as standard (previously, a special HAL was required from the system manufacturer) with Windows NT 4 server, and two-processor support with Windows NT 4 workstation.

There are two sorts of multiprocessing. With asymmetrical multiprocessing, different types of task are assigned to different processors which can result in unbalanced processor use. Windows NT offers symmetric multiprocessing in which any task can be assigned to any processor. While more difficult to implement, you get better processor utilisation.

As to whether programs will run any faster, the answer is that it depends. As a rule of thumb, for someone running just one application on a desktop machine there won't be much (or indeed, any) gain unless the application is specially written to be multithreaded. But if you are running multiple applications or a multithreaded application you can get significant gains, and may well be better off with two slower processors than one fast one — and save some dosh into the bargain. Even so, you'll only see gains if your applications are processor-bound. If it's the hard drive slowing things up, then having two processors waiting on the hard drive instead of one doesn't help anything (except Intel's profits). There's little point in even considering a multiprocessor system if you still use IDE hard drives, for instance.

Where the multiprocessor problems start is if you take the apparently sensible route of buying a dual-processor motherboard and then install one processor with a view to adding the second later. Windows NT has two different kernels, one for single-processor systems and another for multiprocessor systems.

When you first set up Windows NT, normally the single-processor kernel will be the one installed (at some point during the setup program, the kernel type is reported). Thus, to use a second processor you'll have to completely reinstall NT or run a program called UPTOMP that comes with the Resource Kit.

UPTOMP copies the necessary bits and pieces to upgrade from single to multiprocessor kernel. If installing it manually from the Resource Kit CD, be sure to remember to copy the file UPTOMP.INF and to find and read UPTOMP.TXT. And after having installed NT or run UPTOMP, you'll have to apply or re-apply the latest service pack of course. Before playing with any of this, it would help to install a spare working copy of NT on your hard drive, with which you can boot if all else fails. Ideally, you should anyway have this to hand at all times.

Fortunately, you don't need to worry about restoring the system to the uniprocessor kernel if, for some reason, you should subsequently have to temporarily remove the second processor. The system will still work, albeit slightly more slowly than if you had downgraded to the single-processor kernel. And if you want to, you can start up a multiprocessor system using just one CPU by editing boot.ini to add the /onecpu parameter to the start-up line.

And a final note: some of the Windows NT hotfixes which appear between service packs affect the kernel. Make sure you apply the one that is appropriate to the kernel you are using — either the uniprocessor or multiprocessor version — because the hotfixes are not intelligent enough to stop you going wrong here, and if you get it wrong you'll be stuck with an unbootable system.

New folder views

Matthew Willard poses a question to which I'm afraid I don't have the answer; perhaps someone else can help him out? He would like the default view for a new folder to be Detail rather than Large Icon. Apparently, it used to work that way for him but has suddenly reverted to Large Icon. I have IE4 installed here and the default view of a new folder is also Large Icon and I can't find any way to change it. Of course, once a folder has been created it is possible to change the view applicable to that folder, but it's the default view for new folders that Matthew is after. If anyone can help, please contact me by the usual means.

HP OfficeJet Pro 1150C

Lovers of the Hewlett-Packard OfficeJet Pro 1150C will have been frustrated and perplexed that when this product was launched, there were no drivers for Windows NT 4. The reason for this apparently extraordinary omission is explained by a difference between how the US and Europe view Windows NT. Over here, many people (like me) have always seen NT as an application operating system, be it for desktops or servers, but in the US it has until recently been viewed purely as a potential replacement for network file and print services hitherto offered by Novell-powered fileservers.

At long last, HP has woken up to the fact that NT can also be used to power desktop machines and, in Europe, has been quite widely adopted for this task. Thus 1150 drivers are now available both for scanning and printing, but the compressed files available on the web are an incredible 7204Kb and 8,264Kb respectively. While installing the drivers you need 100Mb of free space on the hard drive and once installed they will occupy 60Mb. Of course, the download time is also considerable.

The drivers are available from officejet-support.com/oj1150c/drivers/ntdriver.htm. Unfortunately, these drivers include neither the OCR software nor the picture-editing packages that are supplied on the Windows 95 CD-ROM.

PCW Contact

Andrew Ward can be contacted at NT@pcw.co.uk or write to him at the usual *PCW* address (p10).

Tar for the memory

Having explored the simple use of tar, the tape archiver, Chris Bidmead shifts up a gear to show you how to access individual files on a multi-archive tape and craftily labels a tarball.

Last month we explored the simple use of tar with a local device, like this:

```
tar cvf /dev/st0 <dir>
```

which backs up <dir> to the local tape device /dev/st0.

If you address the tape as /dev/st0 it rewinds to position 0 every time you try to talk to it. I found that addressing the tape instead as

```
/dev/nst0
```

(the "n" standing for "non-rewinding") didn't disturb the current tape position.

When you write an archive to /dev/nst0 a filemark gets written at the end of the file and the tape stays in that position. If you immediately write another archive it won't overwrite the first and you'll end up with two separate archives on the tape. Repeat this exercise n times (and with a 24Gb device like the HP24DAT, n can be very large!) and you have a multi-archive tape.

So how do you get to individual archives on such a tape? One way would be to read out each archive in turn until you get to the one you need. You don't actually need to restore each archive; it's enough just to list them, thus:

```
tar tf /dev/nst0
```

So, to get to the fifth archive on the tape for example, I simply run the above command line four times, remembering to use /dev/st0 for the first command to ensure I start at the beginning of the tape.

There must be a better way of doing this. And, of course, there is. But not within tar. To position and generally manipulate the tape you run a special utility called mt. With mt you can forget about /dev/st0 altogether. Any time you need to rewind the tape you simply give the command:

```
mt /dev/nst0 rewind
```

In fact, while we're about it, let's dispense with the need to mention the tape device by name each time. Now that we're just dealing with a single device we can set a shell variable:

```
TAPE=/dev/nst0 ; export TAPE
```

to tell both tar and mt to use this as the default device. Mt can move your tape directly to any particular point on the tape. For example:

```
mt /dev/nst0 seek 2210
```

will move the tape directly to block 2210. (One complication is that blocks can be

p320 ➢

The Bochs x86 emulator: slow but sure

Several of you have picked up on the suggestion I relayed from reader Derek McKee <dmckee@cix.compulink.co.uk> to check out the Bochs x86 emulator at www.world.std.com/~bochs. Chris Liddel <bcl003@baseng.commm.mot.com>, a software engineer with Motorola's Radio Products Group, is impressed with the technology but warns not to expect lightning performance. He writes: "I had to leave the Windows 95 installation running overnight — it is very, very slow…".

Aidan Boran <aboran@lucent.com> confirms this. He writes: "(1) Bochs is very, very slow (even on a 200MHz Pentium with 64Mb). (2) No mouse support. (3) Installation took a whole weekend…".

Many thanks to Simon Hawketts <simon@shawkett.nildram.co.uk> who took the trouble to send me this screenshot of the Bochs x86 emulator running a DOS window inside the latest Beta 3 build of the KDE desktop

Book review — *UNIX Unleashed: Internet Edition*

I suppose the publisher didn't want to call it *UNIX Unleashed, Volume 2* because that would have made it a hard sell to someone who hasn't already got volume one. This is a pricey product, even for a hardback of over 1,000 pages. But then again, if its content saves you half a day or whatever sorting out some problem, the book would easily pay for itself.

I wasn't quite clear about this volume 1/volume 2 business when I first got the book — the misleading title seems to suggest that it's a second, updated edition — and I wondered why so much of the basics of UNIX were missing. The answer is that they're in volume 1, the proper title of which is *UNIX Unleashed: System Administrator's Edition*. In fact they're not missing because the whole of the original book is supplied on CD, together with a complete electronic version of this latest edition.

These HTML pages are probably the most useful thing about the publication. The contents of both books ranges across a number of different Unices, including AIX, HP-UX, Silicon Graphics' IRIX and Linux. Unfortunately this makes the coverage rather shallow, despite both books being rated intermediate/advanced by the publisher, Sams.

There are also some strange omissions. For example, given the title of the second book I would have expected to have found at least a mention of, and perhaps even a chapter about, Apache, the most widely used (and incidentally, free) web server. The word "Apache" doesn't even appear in the index — although oddly enough, the software is included on the CD.

As well as the text, the CD also contains complete installable versions of Linux and FreeBSD, together with a number of freeware and shareware utilities. This is very handy if you don't have a net connection, although the software provided on the CD tends to be one or two versions behind what you'd get if you fished for it yourself. The Linux, for example, is RedHat 4.2 and at the time I'm writing this you can either download RedHat 5.0 from www.redhat.com or (recommended) send off a couple of quid to The Linux Emporium <www.polo.demon.co.uk/emporium.html> and get the CD by snail mail.

This does rather raise the question of what, exactly, imposing tomes like this are for in these days of internet access. For example, on page 975, the book goes out of its way to tell me that the current version of Netscape is 3.01. At the time I'm writing this, Netscape happens to be up to version 4.x but things move so fast these days I wouldn't even dare make an assertion about "the current version" of anything even in this magazine, let alone in a hardcover book with a shelf life of at least a year. Details like this really only belong on a frequently updated web page.

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different sizes, so for now I'm just sticking to the default size and ignoring this point. And things work fine.)

Now you can use mt tell to report the current position (in terms of the number of blocks from the start of the tape).

Similarly, mt eod will move to the "end of data" which is the place to write the next archive without overwriting the existing tape contents.

Labelling archives with GNU tar

Here's a simple manual system I devised for handling multiple tape archives. It uses a feature of GNU tar we haven't mentioned yet — the ability to attach meaningful labels to archives. So, for example:

```
tar cvV "Total Backup" /
```

will backup all your files below the root and label the archive "Total Backup". V stands for volume, the old parlance for a tar archive, which you'll also find is sometimes called a "tarball".

• *Here's a little tip: It took me ages to realise that there's no point labelling a backup "Backup" — of course it's a backup. You can put the label space to better use by inserting the current date using command substitution:*

```
tar cvV "`date` Total" /
```

Now, we know how to position tape and to write and read archives. What I like about this is that we're working at the command line, taking control at a low level which lets us understand exactly what's going on. I also relish the fact that everything we are

The path to Enlightenment

A number of readers, including Glen Grey <slaine@enterprise.net>, David Coulson <root@djcoulson.demon.co.uk> and Geoff Roughton <Geoff@sharron0.demon.co.uk>, have been urging me to cover their favourite X Window Manager, Enlightenment. If you are artistically inclined, it opens up all kinds of possibilities, as you can see from this pyrotechnic desktop borrowed from Enlightenment guru Carsten Haitzler's web page at www.rasterman.com

Questions & Answers

■ *This month I have received a whole list of questions from reader, Geoff Wexler* g.wexler@open.ac.uk

Q I'm getting much correspondence about the superior reliability of Linux/UNIX over any version of Windows. Do you agree?

A No question, Geoff. I wouldn't bother doing this column if I thought otherwise. Actually, it's not just reliability that's the issue. UNIX has an entirely different philosophical approach to the question of what an operating system is for, but that's a longer story.

Q I might be buying a new computer soon and am tempted to start by partitioning part of the hard disk and reserving a part of it for UNIX. Do you think that would be sensible? If so, could advise me how to find out more?

A In answer to the first part of your question, yes, and it's very easy to do these days, now that 2Gb drives seem to be the entry level. (My first hard drive was 3Mb — yes, that's megabytes!) Windows 95 is still going to leave you plenty of room for an extra, say, 800Mb, which is fine for a full Linux installation.

Visit www.linux.org and follow the documentation link there (it's embedded in text) to the HOWTOs. There are several mini-HOWTOs on running dual- and multi-boot Linux systems. At www.linux.org/help/projectguide you'll find several online books including "Installation and Getting Started Guide" (recommended). Also visit www.ora.com and find out how to get hold of the hard copy of "Running Linux".

You also ask me "Is it a steep learning curve?" I never know what this expression means. Literally, a steep learning curve would mean that you learn quickly, assuming the usual (horizontal) position of the time axis!

To be frank, you probably won't have the impression of learning quickly with UNIX. It's nearly a 30-year-old operating system and a lot of wisdom has accumulated around it and within it.

Documentation is freely available by the ton, but it's sometimes contradictory and some of it is out of date. Windows gets you started more quickly and manages to give you the impression of learning fast, but in my opinion the knowledge you acquire is shallow and doesn't help you out of a fix when things go wrong. Acquiring UNIX knowledge tends to be a slower burn, but things fit together better and you get more insight into what goes on below the water line. Eventually, this all adds up to a sense of understanding and control that you'll never achieve with Windows.

Q Can you type Greek letters and maths symbols in UNIX?

A Yes. UNIX has been used by scientists and academics pretty much since its inception. It's the home of TeX, a pioneering computer text compositing system (see, for example, sunsite.doc.ic.ac.uk/packages/TeX) and there are many other approaches to the same task available under UNIX.

learning at this level is platform, hardware and manufacturer independent.

Next month we'll move up to the next level and assemble what we've learned into a simple shell script.

ISDN routers and IP-Masquerading

Your email to me shows much more interest than I'd dared hope in my rather flash ZyXEL ISDN router (*PCW*, February) and the fast internet connection it provides, pretty well automatically, to all the machines on my network.

I've dared suggest that a dedicated router like this, with a basic street price of what one used to pay for a decent modem a year or so ago, renders obsolete the complexities of a dedicated Linux machine with IP-Masquerading.

Reader, Richard Oxborrow <richard@micrologic-ltd.co.uk> is among those arguing that I'm being too simplistic about this. He's taken the trouble to put up a helpful web page on setting up a Linux machine as an ISDN router, at www.micrologic-ltd.co.uk/linux. Thanks, Richard.

PCW Contact

Email **Chris Bidmead** at unix@pcw.co.uk

What a **performance**

Terence Green takes a look at performance perks or perils when changing from Windows to Warp. He opens up advice on locked files and considers whether it's good to talk on the net.

Lots of readers write to say that they are running Windows 3.1 or Windows 95 and would like to upgrade to Warp. Many readers are running on older 386s and 486s with low memory configurations and this obviously raises some doubts as to whether they'll find performance to be the same, better or worse with Warp installed.

Paradoxically, the Warp 3 system kernel isn't as highly tuned as Warp 4 but the former generally runs in less memory because users have fewer bells-and-whistles system services to add. WarpCenter is handy but it adds to the memory requirement, as do background graphics and other user-interface improvements. For more information on the subject of performance tuning, look on IBM's Warp web site for Warp 3 and Warp 4 tuning papers (Fig 1).

Justin Megawarne wanted to know whether OS/2 Warp 3 would run on his 486SX2/50 with 4Mb RAM and a 270Mb hard drive. Yes, it will. Warp 3 calls for 35Mb to 50Mb of free disk space and the Bonus Pack, which includes the Internet Access Kit, needs another 30Mb.

One of the first points to note is that Warp 4 requires a 486 processor running at 33MHz or better, so if you have a 386 or even a 386SX you will have to be content with Warp 3. Although it is discontinued it's still possible to find old copies, even shrink-wrapped and boxed, by searching through classified ads online and through the MicroMart section of *PCW*.

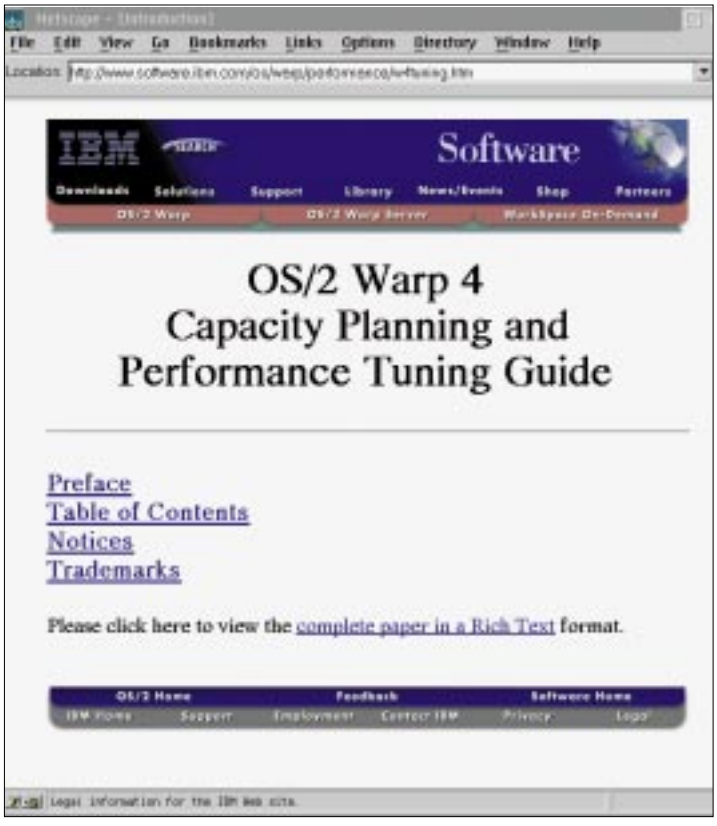


Fig 1 Warp 4 tuning information can be found at www.software.ibm.com/os/warp/performance/w4tuning.htm

Warp benefits 486

A good point was made by Tony Rogers, who says the performance benefit Warp has over Windows 95 is less pronounced on a Pentium whereas with a 486, on which he loaded Warp, there was a marked improvement. Tony thinks this is due to the Warp kernel and I would agree with that in the case of the base operating system. It seems self-evident to me, having used both Warp and Windows 95 for years, that an OS/2 kernel is more reliable and efficient than a DOS kernel.

The situation changes once you begin to add applications and extra services such as networking and internet access. At this point, memory and swap space on disk becomes more important than sheer processor speed, although a Pentium will always have an edge over a 486. Operating systems' blurbs always post low minimum RAM requirements because back in the dark ages of two years ago, memory cost ten times as much as it does today. The point to bear in mind is that minimum memory refers to the least amount of RAM that will support the base operating system. In other words, once the OS is running you can look but don't touch!

More memory

It always pays to upgrade your memory. The 30-pin SIMMs that fit most 386 and 486 PCs aren't quite as cheap as Pentium RAM, and the price dropped more slowly, but they're a quite reasonable investment

p324 ➢

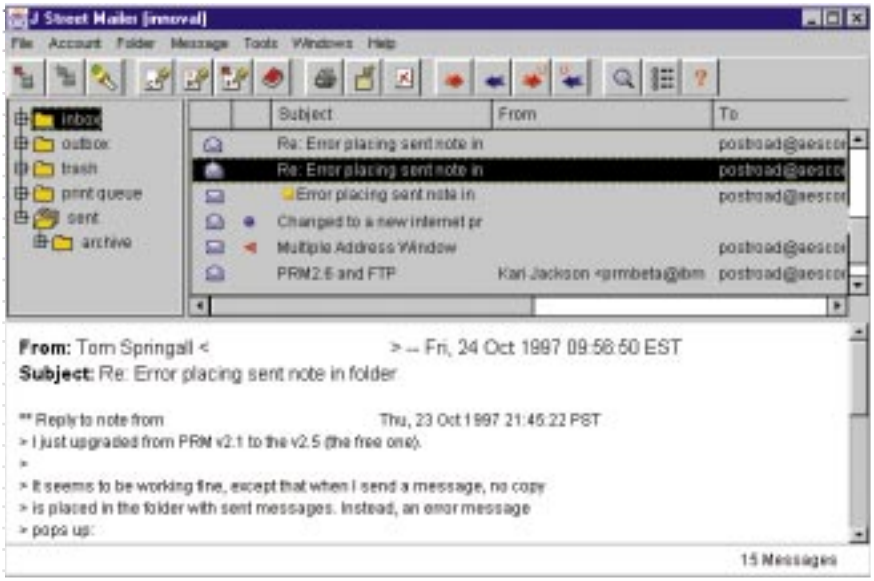


Fig 2 **Java email: J Street Mailer from the people who brought you Post Road Mailer**

now if you intend to continue using a 386/486 for the next year or longer.

The minimum memory requirement for Warp 3 and Warp 4 is 4Mb RAM but this figure refers to the base operating system only. It needs to be adjusted upwards according to the features you use. For example, if you run Warp 3 or 4 and run a word processor and nothing else, you can get good performance with some simple system tuning. As soon as you start adding services you bump up the amount of RAM in use, and if you don't have enough the swapfile comes into play.

Take internet access, for example. The TCP/IP stack in Warp needs between 4Mb and 6Mb just to sit there in memory waiting for you to go online. Add that to your 4Mb base requirement, and a 386SX running the Internet Access Kit needs at least 10Mb RAM to avoid swapping.

Due to design, Warp will always swap regardless of how much RAM you have, but the aim should be to match the real RAM requirements of your "working set" as best as possible with a combination of RAM and swapfile to reduce excessive swapping.

Internet phones

AC Littlejohn has written to me asking about internet phones. I'm not really up on the subject, having been previously put off by poor quality, so I guess I need to try harder. If any readers have suggestions…

My own feeling is that Java is the most likely candidate for new web applications for OS/2. Thus far there is the AOL Instant Messenger for Java (available from Netscape's site) and ICQ for Java (in beta).

Java emailer

As I was writing this month's column InnoVal released the first beta of its Java emailer, J Street Mailer (Fig 2) at www.innoval.com. I haven't tried it yet, but it's a sign of the direction in which web applications for OS/2 Warp are heading.

I see loads of OS/2 users in the newsgroups with ICQ pager numbers now.

There still seem to be some problems but there's a new version of Java 1.1.4 for OS/2 and an updated Netscape Navigator for OS/2 that supports it. I'll be trying these out, along with ICQ Java which you can find at www.mirabilis.com.

Locked files

Chris Potts had a problem with locked files when trying to upgrade WordPro96 for OS/2. The upgrade requires a number of files to be re-named including WORDPRO.EXE which resolutely refused to be renamed, claiming to be "in use" despite all running applications having been closed down. The usual way to defeat the problem of locked system files, and files that reference DLLs which are housed in one of the paths named in the CONFIG.SYS, is to boot the system from floppy disks so as to bypass the system CONFIG.SYS before re-naming the file.

PCW Contact

Terence Green can be contacted by post via the usual *PCW* address (p10) or by email at os2@pcw.co.uk

Ruler rules, OK

Tim Nott's bluffer's guide to tinkering with those tiny ruler buttons will set your documents on the straight and narrow. And, how to auto-open and export multiple WordPerfect files.

Yes, it's that thing with the tiny little buttons that are almost impossible to get hold of and which you can never remember what they do. So here's a quick seven-point bluffer's guide to rulers:

1. The little square at the left of the ruler toggles between left, right, centred and decimal tabs. Choose your tab then single-click on the ruler to place it. You can then drag them around. To get rid of them, drag them right off the bar.
2. The tiny triangles control indents or paragraph boundaries: top left is the first line of a paragraph, bottom left the rest. Dragging the little square below the bottom triangle moves both. The right triangle moves the right boundary of the paragraph.
3. Note that you can move paragraph boundaries outside the page margins. These settings, as with tabs, only affect the current paragraph so if you want to apply them to several paragraphs you need to select the latter first.
4. With tables you can control column divisions and indents within each column. Text boxes, frames and snaking (newspaper-style) columns also have ruler controls when selected.
5. To set margins with the ruler, put the pointer over the white/grey join so it turns to a double-headed arrow, then drag. This only works in page layout view.
6. Holding down the Alt key as you drag ruler controls gives a continuous numeric readout of the distance between margins, tabs and indents.
7. Finally, if you hide the Word 97 ruler (it's on the View menu, not Tools, Options) to get a little more screen space, you'll find when you waft the pointer over where it should be, it slides out automatically.

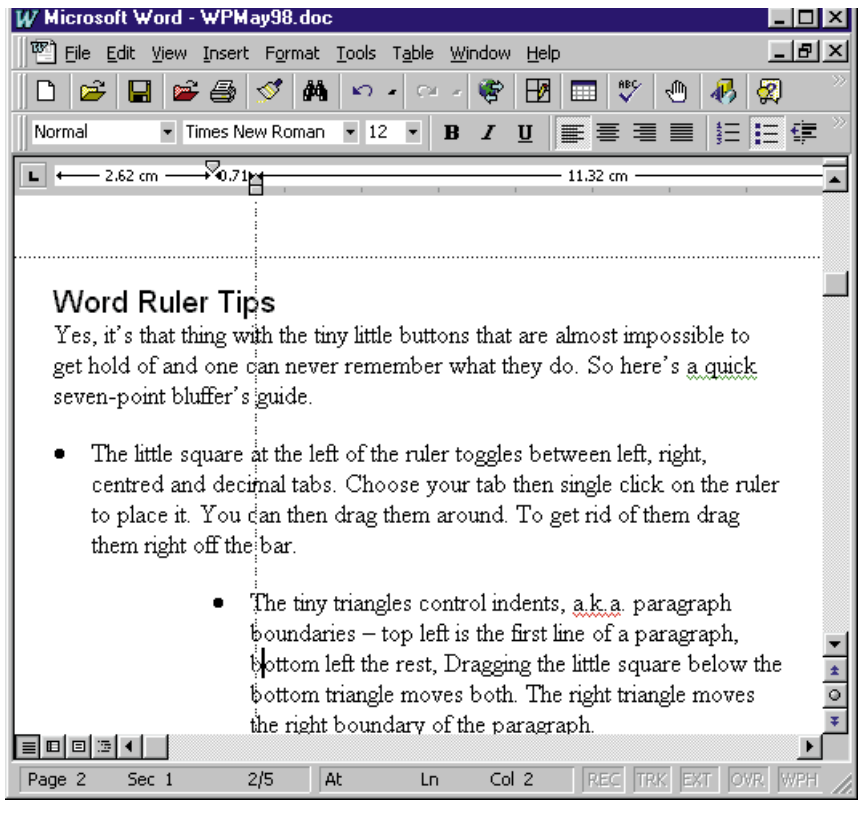
Feedback frenzy

David Graham's plight, outlined in my column in the March issue, was that he had 2,000 WordPerfect secondary merge files created in various versions of WordPerfect. He wanted to find a way to automate the opening of each of these files in turn, to export the data from each file to another. I hadn't a clue how this could be done, so I threw it open to the floor.

James Gilliver and Jon Moorby both rose to the challenge. James first:

"Having faced a similar problem in mass-converting thousands of documents from WordPerfect to Microsoft for one of my clients, I would suggest that WordBasic could provide a medium for such an operation by using it to read each merge file in turn and copy the contents into an appropriate word document (which could then be resaved as a WordPerfect file if required).

"I appreciate that this may seem like sacrilege to a WordPerfect user, but needs must. Alternatively, since WordPerfect secondary merge files can be saved as text (the field and record delimiters become control characters) it should be possible to effect a conversion by concatenating all the files using a macro-equipped DOS text



Hallelujah! It's the ruler. This screenshot took both hands and a nose

editor (anyone else remember Intel's AEDIT? I still have a copy and I find it invaluable) and reformatting as necessary."

And now, Jon: "*I don't have any experience of WordPerfect beyond v5.1, but I suggest that the solution may be one of creating a file list using DIR /b > file.txt. I used to do this a lot to extract data from text output files generated by statistics programs.*

"If a macro could be written to do the job for just one of the files (and it may be better to do it by importing into the spreadsheet, rather than exporting from WP, or it may have to be a combination) then a search-and-replace for the CR/LF combination on the file.txt list will enable a macro (presumably a huge one) to be created to process each file in turn, by name. Alternatively, under VBA, Word and Excel 97 would be able to do the job by taking filenames directly from the file.txt file in a loop."

Nerd processor

It struck me that a column on the subject of word processing really ought to concern itself from time to time with the raw ingredients and end product. After all, were this a column about food processors, then I wouldn't just be rabbiting on about how to clean them, change the fuse, lubricate the bearings and get hardened batter out of the hollow bit that whizzes round. Most people would expect a recipe or two and perhaps a few tips on where to obtain the best avocados at this time of the year, or the secrets of successful mayonnaise.

However, it seems that because this column is all about computers, we can cheerfully forget about the words themselves and concentrate instead on the perfection of our digital dexterity and general nerdhood.

Which brings me neatly to a fine example. Why do we call people whose technical ability exceeds their social skills "nerds"? Or "geeks"? Or "anoraks"?

The word "nerd" is attributed to the children's writer, Dr Seuss, who, in his 1950 book *If I Ran a Zoo*, wrote: "And then, just to show them, I'll sail to Ka-Troo and bring back an It-Kutch, a Preep and a Proo, a Nerkle, a Nerd, and a Seersucker, too".

After that, nerd seems to have acquired the meaning of a swot, before being taken up as a computing-specific term. I

Questions & Answers

Q A friendly and helpful colleague installed my software and in Explorer I note that all files etc. that I generate are attributed to *Lyn*. How can I change the registered name so that it appears correctly? Because I use Word as my email editor the erroneous Lyn appears on that, too.

Lynn Tulip

Please get my name right: rectifying installation errors

A You can change the author name for individual documents from File, Properties (File Summary Info in Word 2). To change the default author name go to Tools, Options, User Information. The name here is originally taken from that given on installation but can be changed — all subsequent documents will reflect the change. You'll still see the original, incorrect name in the Help, About box, but it takes a reinstallation to change this.

Q Ligatures are letter combinations, such as fi or fl, that are often joined on the printed page to give a more harmonious look. In Times New Roman, for instance the dot of the i interferes with the dangling part of the f. It is possible to get these on a Mac, but how can this be done on a PC?

Nick Lawrence

If it fits, flaunt it: ligatures come to the core fonts

A Up until today I'd only seen ligatures in custom-made Adobe Type 1 fonts where they replaced other standard characters in the upper ASCII range, but having a look through the Word 97 Insert Character dialog, under Normal text I found these right at the end of the list. You may need to update the Windows core fonts to get them (see "Euro update" in the "Readers' Tips" box on p328).

Q My problem is disk space and no money to get more. What I would like is a compact and reliable WP. It has to run under NT4 or, at a push, under OS/2. It can be shareware or preferably freeware. Would you be able to point me in the direction of something like this? It doesn't have to have loads of whizz-bang flashy-button stupid paperclip things; it should just be able to produce a sensible, clear document but be a tad more flexible than Wordpad.

P.S. Could you please send any reply to the _ slayer@unforgettable.com as this follows me around.

Jerry

Cheap and cheerful: Word Express

A I'm rather worried about this slayer who is following you around, but there's a shareware product called Word Express which isn't bad. Last time I looked it had everything except a macro language and took up less than 9Mb of

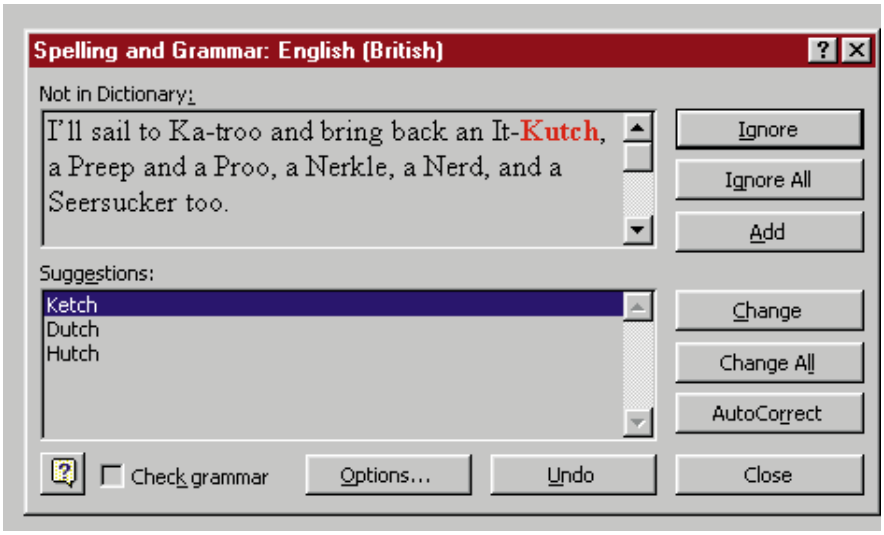
wonder what accident of language means that we don't speak of nerkles or preeps?

A geek seems to have been popular as a description of a "wild man" kept in a cage at circus sideshows, to entertain the visitors by biting the heads off live chickens or snakes. I don't think they go in for that sort of behaviour in the Redmond office cubicles, so why "programming geek"? Alternatively, the word in the simple sense of a fool may go back to Shakespeare's day. In Twelfth Night Malvolio says: "Why have you suffered me to be imprisoned… and made the most notorious gecke and gull that e'er invention played on?"

The most mysterious, however, is the term "anorak". The word itself comes from Greenland and means a waterproof jacket with a hood, usually sealskin and often highly decorated with beads.

Did the Eskimos sit around in their igloos boring each other senseless with techie-speak during the long, dark, Arctic winter? Or did they spend long, cold days standing around kayak-spotting?

Your opinions on this and other important or irrelevant matters would be appreciated.



It appears that the Microsoft Word spell-check is not familiar with Dr Seuss

Readers' tips

Euro update

Thank you, Nick Mortimer, for the good news that further fonts with the Euro symbol are available from /www.microsoft.com/typography/fontpack/default.htm. I've since noticed that the Windows 98 beta core fonts all now contain the Euro. The problem is, as we saw in March's column, getting at it.

Personal preference

Thom Milton pointed out a useful tip that really belongs in the Windows rather than the WP section, but never mind. If you use the general MS Office Open Document command, you may find it starts in My Documents irrespective of where you actually keep your documents. You can change this by backing up the Registry, then opening Regedit and going to: HKEY_CURRENT_USER\ Software\ Microsoft\ Windows\ CurrentVersion\ Explorer\ User Shell Folders. Double-click the entry in the right pane entitled Personal and change it to the path of your choice.

Text squared

Here's an admirably obscure Word tip from someone who signs herself, or himself, Gadiewasam. If you hold down the Alt key while dragging with the mouse, you can select a rectangular area of text such as one column of a tabbed list. Word 2 users can do this with the right mouse button.

No conspiracy

In my March column I mentioned the strange case of the Word file which continued to load from a double-click and have its extra properties visible from a right-click, after the .DOC extension had been removed. Thanks to Ben Summers for the following explanation: *"Most MS apps use an OLE-structured storage file format which stores properties — which explains why they still show up as extra tabs on the properties dialog — and the program that created them, in a common format. Windows 95 and NT recognise this format so the conspiracy extends to everyone who uses this file format, support for which is built in to the OS. It basically stores a directory-type structure inside a file."*

■ Please note: although I do like to hear from you, may I please remind you not to send binary attachments to text messages. This especially applies to WP files containing macros — for reasons that should be obvious. Stick to plain-text only, please, for hints, tips and macro code.

Q & A (cont'd)

disk space. A UK contact is the Thompson Partnership on 01889 564601 or www.ttp.co.uk.

Alternatively, have a look at Yeah Write and Trellix which were mentioned in the November and December '97 columns (see the Hands On back issues on our cover-mounted CD-ROM).

Q We have two identical PCs at work, both with identical, or so I thought, Office 97 installations. One takes much longer to close a document, even if it has just been saved. This seems to happen to large and small documents alike. As far as I can tell, all the relevant options in Word are set the same on both machines.

Malcolm Klein

A It's not Word that is slowing down your machine it's… (dramatic pause — Nott moves to centre stage, wheels around swiftly, cloak swirling, finger pointing at…) Outlook! (Lady Bartwell faints, the butler makes a run for it but is seized by two policemen.)

Aha! Even if you don't think Outlook is running, it's there, secretly spying on your every move. There is an option to create a "journal" that logs all the files you work on. Turn this off from the Outlook Tools, Options, Journal, Also record files from… box.

PCW Contact

You can contact **Tim Nott** by post via the usual *PCW* address (p10) or at wp@pcw.co.uk

Pigeon coup

Whether or not you fancy pigeons, follow Stephen Wells' advice as he homes in on how you can use spreadsheet rankings to add a useful dimension to your leisuretime activities.

I often receive questions from hobbyists about using spreadsheets for summarising and analysing their records. These queries are often too specialised to be of general interest but the matter of ranking results is a common topic. Let's take the fictional example of a pigeon racer.

To keep it simple, let us assume that your club races monthly and that you have nearly two years' results for your own birds. First, 2nd, 3rd and 4th prizes are £50, £25, £15 and £10 respectively. Each month you win a prize with one of your five pigeons: Boss, Hasty, Jack, Spud and Whitey. In January, Hasty wins £10. In February, Whitey wins £25. In March, Boss wins £50.

Enter the race dates in the range E2:E24, the pigeon names in F2:F24 (and give it the name, Pigeons) and the winnings in G2:G24 (giving this range the name, Winnings). I've used Excel in Fig 1.

Now we'll enter the pigeon names in alphabetical order in A2 to A6. In B2 to B6, we want to total each pigeon's cash winnings, so in B2 we enter

```
=SUMIF(Pigeons,"Boss",Winnings)
```

In B3 to B6 is the same formula except for the change of pigeon name in the middle. The syntax of this function is as follows: "Pigeons" typifies the range of cells we want evaluated, "Boss" represents the criteria which defines what cells will be added, and "Winnings" is the range in which to look for the cells to sum. In other words, we want to look at all the pigeons, pick out the applicable one, and add up its winnings.

With a list as short as this, it's easy to see the best- and worst-performing pigeon. However, we can enter the RANK function just to see how it works. In cell C2 enter

```
=RANK(B2,$B$2:$B$6)
```

This means B2 holds the number we wish to rank, and B2:B6 is the list of numbers with which to compare it. You can drag this formula down to C6. The RANK function gives duplicate numbers the same rank; as Jack and Whitey tied for 3rd place, there is no fourth place so Hasty drops to 5th position.

This example is in the file, "Position.xls", on this month's CD-ROM.

Microsoft Excel - Ranking.xls

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F	G
1	Pigeon names	Total winnings	League position		Race dates	Pigeon names	Winnings
2	Boss	£120.00	1		Jan-15	Hasty	£10.00
3	Hasty	55.00	5		Feb-15	Whitey	25.00
4	Jack	75.00	3		Mar-15	Boss	50.00
5	Spud	90.00	2		Apr-15	Spud	15.00
6	Whitey	75.00	3		May-15	Jack	10.00
7	Total	£ 415.00			Jun-15	Boss	10.00
8					Jul-15	Whitey	25.00
9					Aug-15	Jack	10.00
10					Sep-15	Spud	15.00
11					Oct-15	Hasty	10.00
12					Nov-15	Boss	10.00
13					Dec-15	Hasty	25.00
14					Jan-16	Whitey	15.00
15					Feb-16	Boss	25.00
16					Mar-16	Spud	50.00
17					Apr-16	Jack	15.00
18					May-16	Boss	10.00
19					Jun-16	Whitey	10.00
20					Jul-16	Jack	15.00
21					Aug-16	Spud	10.00
22					Sep-16	Hasty	10.00
23					Oct-16	Boss	15.00
24					Nov-16	Jack	25.00

Fig 1 **On the right of the screenshot is the list of pigeons and their prizes. At upper left, the pigeons' winnings are totalled and ranked**

Language problem

Steve Lyons, of Bubendorf, writes: "*I have a problem with Excel 5.0. The company I work for is in England and Switzerland. We routinely send spreadsheets between the two sites regarding configuration information for the machines we manufacture. The problem is that the team in England are not able to open some spreadsheets from the team in Switzerland due to a missing file called VBADE.DLL. Is this to do with the Visual Basic macros, using the German language?*

"*Is there any way I can get around this, other than emailing, with the spreadsheets, the VBADE.DLL and associated VBADE.OLB files? This would be a little over the top as eventually we will also need to send the spreadsheets to our sister companies in Denmark and the US, and perhaps even to our clients.*"

I sent Steve some general information about dynamic link libraries, but after a couple more messages Steve said he found the easiest solution was to delete the module worksheet which was calling for these files. All the sheet contained was a macro, written in German, for displaying a custom Visual Basic toolbar that wasn't needed. I'm grateful to Steve for letting me know the outcome.

It is my understanding that with Excel 97, one is less likely to have this language problem. Object library files (with the .OLB extension) are now incorporated in the DLL files. You are more likely to have problems trying to use Excel for Windows macros on a Mac, than going from German to English.

You can install Multilanguage support by choosing Start, Settings, Control Panel and the Add/Remove Programs icon. Then click the Windows Setup tab. In the Components

box, click Multilanguage Support, and then click Details and select the check boxes for the language or languages you want to use.

Wandering symbols

Willie Miller writes: "*I have a problem with Excel 5.0a on Windows 3.11. If I type a number in a cell and wish to have commas entered automatically, I choose Format, Cell, Number, but all the options show the commas raised to the top of the line rather than in their normal position (i.e. instead of 4,537,567.00 it shows 4'537'567.00). How can I get the program to revert to normal? I've checked the languages in Control Panel and Excel; both are UK English / English International. The problem also affects Word 6 if I use calculation fields. It sounds like a reinstall to me — but I'd rather not.*"

Go to Control Panel, Settings, Number, and check the Digit Grouping Symbol. This is for all Windows applications. Also, it's not unusual for Excel users to be messed about by Word settings. Readers often find that other users have changed a setting in Word, which then affects Excel. Go to Word, Tools, AutoCorrect and check carefully through AutoText and AutoFormat.

Willie replied: "*In Control Panel under settings, the number format had been changed to 1'234.22. I changed it back to normal and Excel is now okay. Thanks.*"

Two to a page

Jacques Dillen asked: "*How do I print more than one sheet out of a workbook onto the same page?*

"Using Windows 95 I find that Excel prints every sheet on a new page and I sometimes want to avoid that and follow on with a second sheet after the first, on the same page. So far, I have to feed the sheet in again and adjust the page setup for the second sheet so that it prints further down the page rather than overprint the first sheet already there! That is highly unsatisfactory."

I replied that the easiest way would be to open a new Word document and link pages into that. Jacques responded: "*Stephen, thanks for your advice. It works perfectly!*"

Playing footsie

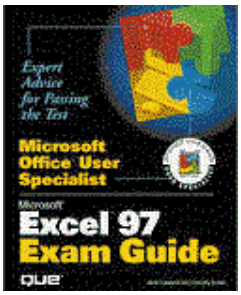
It seems like every month it gets easier to download London share prices straight into spreadsheets. Fig 2 shows the top of the MoneyWorld opening page at www.moneyworld.co.uk/stocks. Scroll down, and you are offered a number of options for downloading. If you download the current FTSE 100 prices it will put a file called ftse 100.tsv in the directory of your choice (TSV means Tab Separated Values).

Later, offline, you can import this file into your spreadsheet. In Excel, choose Open. In the Files of Type box, choose All Files. Now your new .tsv file will show and you can select it to open. In Excel 97, this will automatically start the Import Wizard.

You can probably successively accept the default settings (Delimited, Tab, General). The file will immediately open with

p336 ➢

Testing times — the *Excel 97 Exam Guide*



Newspaper recruitment ads for executive PAs often specify the need for familiarity with MS Office applications. Now that Microsoft offers two levels of a Certified User exam (Proficient and Expert) you can expect some employers to ask for these qualifications. Part of a new series by Que, the *Excel 97 Exam Guide* is written by Jane Calabria and Dorothy Burke, instructors, consultants and frequent contributors to Que books. Of course, you could ignore the section about registering for the exams and taking the tests and just read this book to learn all the features of Excel 97. There are 31 lessons covering not only the basics like managing workbooks, formatting, printing, importing and exporting data, and creating charts, but also many advanced areas are also explained. You can become more familiar with graphics and other objects, with advanced use of Excel as a database, auditing, creating macros and sharing workbooks in workgroups. There is a useful glossary of spreadsheet jargon and one of the best-integrated CD-ROMs I have seen. Each lesson has at least two files on the CD: a worksheet on which to carry out the practice exam questions at the end of each chapter, and an example of each completed exercise.

■ **Price** £27.99 (inc CD-ROM)
Contact Computer Manuals 0121 706 6000 www.compman.co.uk

Fig 2 Home page of the MoneyWorld web site from which you can download selections of the latest London share prices

	A	B	C	D	E	F	G	H
3	Epic	Name	Mid	Change p	Change %	Bid	Offer	Open
4	II	3i Group	508.5	3	0.6	507.5	509	508.5
5	ANL	Abbey National	1187	-8	-0.6	1185	1188	1190
6	AL	Alliance & Leicester	878	3	0.3	877	879	876
7	ALLD	Allied-Domecq	664	-1.6	-0.2	663.5	664	667
8	ASSD	ASDA Grp	194.75	0.25	0.1	194.25	195	193.5
9	ABF	Ass British Food	614	14	2.3	612	616	605
10	BAA	BAA	474	10	2.1	473.5	474	464
11	BSCT	Bank of Scotland	604	8	1.3	603.5	604.5	597
12	BARC	Barclays Bank	1680	2	0.1	1678	1682	1676
13	BASS	Bass	906.5	6.5	0.7	906	906.5	900
14	BATS	BAT Ind	567.5	-2.5	-0.4	567	567.5	568
15	BG	BG	318.25	-1.75	-0.5	317.5	319	318
16	BLT	Billiton	134.75	-0.5	-0.3	134.5	136	134.25
17	BO	Blue Circle Ind	306.75	-5.25	-1.6	306.25	308	310.5
18	BOC	BOC Grp	860	-7	-0.8	859.5	860	869
19	BOOT	Boots	841	10.5	1.2	840.5	841	836.5
20	BA	Br Aerospace	1604	0	0	1603	1606	1609
21	BAY	Br Airways	521.5	2.5	0.4	521	521.5	522
22	BLND	Br Land	752	3	0.4	751.5	752	746

Fig 3 FTSE 100 data loaded into an Excel worksheet from a file offered at the MoneyWorld web site shown in Fig 2 (above)

Q & A — XLS

Q How can I tell how many pages my printed document will be?

A Hold the Shift key as you choose the Printer icon (or choose the Print Preview icon) and the number of pages will appear in the Status Bar at the bottom of the window. If the Status Bar isn't displayed, Choose View, and click the Status Bar check box.

Q How can I stop some cells on a sheet being changed?

A Hold Ctrl and click on the remaining cells which can be changed, or highlight them by dragging across a range. Then choose Format, Cells, Protection, OK. Choose Tools, Protection, Protect Sheet and enter an optional password if you wish.

Q What's the difference between a formula and a function?

A Not a lot — a function is simply a predefined formula.

Q How can I get Excel to use dBase, Paradox, Access or FoxPro data files?

A Use Add/Remove programs in Control Panel to install an Excel supplementary program called Microsoft Query. It offers you the choice of a Query Wizard for simple imports, or you can create a parameter query (which establishes conditions, such as only import data about a particular customer).

Q Can I AutoFill column headings in quarters rather than months?

A Yes. Excel establishes the step value by comparing the first two cells selected. If you enter Mar in cell B1 and Jun in C1 and drag the fill handle, Excel will use a step value of 3 and display Sep in D1, Dec in E1, and Mar in F1.

Similarly, if you enter Qtr 1 in B1 and Qtr 2 in C1 and drag the fill handle, Excel will use a step value of 1 and display Qtr 3 in D1, Qtr 4 in E1 and Qtr 1 again in F1. And they say computers can't think!

Q How does Excel define the x and y axes in a chart?

A On a line chart, the horizontal x axis usually refers to the data categories such as sales, tax, profit and so on. The vertical y axis refers to the plotted values. A bar chart typically reverses this with values plotted along the horizontal x axis. On a 3D chart, the vertical axis is referred to as the z axis, and the x and y axes are both horizontal.

Unusual functions

These functions are available in later versions of all three current top-selling spreadsheets. Precede the function name with = in Excel and @ in 1-2-3 and Quattro Pro.

■ COMBIN — You have 20 pupils available and three pupils can play on each team. You can calculate how many possible teams could be formed using the COMBIN function (short for number combinations). This function assumes that the order of pupils within each team is not significant. The syntax is COMBIN(N,NC) where N is the number of items and NC is the number of items in each combination. So, in this example, you would enter COMBIN(20,3) and the answer is 1,140.

In Quattro Pro, the function name is COMB and the number of items in each combination is entered first, like this:

```
@COMB(3,20)
```

■ PERMUT — The number of such combinations is not the same as the number of possible permutations that could be obtained. Permutations assume the internal order is significant, as in calculating probabilities.

Given 20 differently coloured marbles, the permutation function, PERMUT, calculates how many different ways an ordered subset of three marbles can be constructed such that no two constructions contain the same three marbles in the same order. Different constructions can contain the same three marbles but they cannot share the same ordering. Using the same numbers as above you would enter PERMUT(20,3) and the answer would be 6,840.

■ SUBTOTAL / GRANDTOTAL — Subtotalling using a function is a useful feature you may not be employing. It's intended for database lists but you can use it in any worksheet:

1. In Excel, the Subtotal function will add up everything in a range except another subtotal. You might have a list of values in cells A1 to A6 and want a subtotal in A7. Then more values in A8 to A13 and another subtotal in A14 and a full total A15. In A7, enter =SUBTOTAL(9,A1:A6). In A14 enter =SUBTOTAL(9,A8:A13). In A15 enter =SUBTOTAL(9,A1:A14). You can't use SUM in A15 or the total will be twice what it should be. The first argument in the function is a number, 1 to 11, which specifies whether you want the values added (9), averaged (1), counted (2) and so on.
2. The Lotus 1-2-3 @SUBTOTAL function doesn't have the extra argument. Nor could you use it in cell A15. Instead you would use @GRANDTOTAL(A1..A14). GRANDTOTAL only adds the subtotals.
3. Quattro Pro works just like Excel, except for the @ sign. So, you could enter @SUBTOTAL(9,A1..A14) in cell A15. Alternatively you could use the GRANDTOTAL123 function which, logically, works like the 1-2-3 GRANDTOTAL function.

ftse100 on the worksheet tab and the data laid out as in Fig 3. The only formatting you need to do is adjust your column widths and bolden the column labels in row 3. After a couple of goes you'll find you can complete the operation in a few seconds.

At home on the range

A reader, just signed "Ken", who is more familiar with Lotus 1-2-3, asks how to print selected ranges in Excel 97. Let's assume he wants to print columns A to C plus column H from row 1 to 20. Choose View, Page Break Preview. Click on and drag the surrounding blue border to cover the area A1: H20. Click between column header letters G and H and drag left to C. Excel displays the block which will print. Select this whole block. Right-click within it and choose Set Print Area on the Short Cut menu. Now choose File, Print, Printer Properties and make sure they are as you expect. Then print your worksheet.

Later, to restore display of the missing columns, drag over column letters C and H and double-click between them.

PCW Contacts

Stephen Wells can be contacted at the usual *PCW* address (p10) or email spreadsheets@pcw.co.uk

Let's make **a date!**

Mark Whitehorn fixes you up with Access functions in general and date functions in particular. But first, which is the one for you — GUI or command line? Let's talk about it...

In the March 98 issue of *PCW* I wrote about GUI database admin tools and how much I preferred them to the more common text-based ones. The following arrived from Mark E Nolan:

"I'm sure you never expected to make those comments about GUI admin tools in your article and get away without any correspondence on the subject!

"I don't want to take issue with any of your general points. However, a significant advantage for us of using a command-line interface (working with Sybase on Solaris) is in admin and change control.

"All tables, stored procedures, triggers etc. are in individual Unix files. These files have extensive comment blocks including edit histories and are stored in a version control system. This means:

1. We can see the edit history of all database components.

2. We can use Unix tools to apply bulk changes, where necessary.

3. We can recreate the database schema in moments. For example:

```
cat *.sql | isql -U...,
```

plays all .sql files into a database. I'm sure there are other advantages, but these are the ones that occur to me straight off."

I have no argument with this at all. I have nothing against command-line interfaces; in fact, I still use a DOS command line for some file-copying operations because I can use that faster than Windows Explorer. In addition, I still use DOS batch files because Microsoft has never come up with a viable GUI alternative in Windows. However, GUIs come into their own for some operations, and querying, as discussed in the March issue, is one of them; at least it is for me. I can type raw SQL but I can work faster with a GUI, particularly for complex expressions.

Fig 1 Calculating age in Access

```
Function GetAge (varBD As Variant)
    Dim varAge As Variant

    varAge = DateDiff("yyyy", varBD, Now())
    If Now() < DateSerial(Year(Now()), Month(varBD), Day(varBD)) Then
        varAge = varAge - 1
    End If
    GetAge = varAge
End Function
```

Clearly the best of both worlds is to get both a command line and a GUI. Since almost all RDBMSs already have a command-line interface and the GUI is simply a bolt-on, it seems unlikely that the command line will disappear, at least for the foreseeable future.

Printers

"In your March column you printed a question from Simon Smith about selecting printers from within Access at runtime. Microsoft has produced an OCX component for this (commdlg.ocx) but a more flexible shareware utility is available from Attac Consulting ourworld.compuserve.com/homepages/attac-cg/acgsoft.htm. This works with reports only, and will not enable a printer to be selected when printing other objects such as forms."

Ken Sheridan

I visited the site and discovered a whole host of goodies, so all you Access freaks out there might want to go along and have a look. Ken sent me a file that he had downloaded and I was tempted to put it and several others on the CD-ROM, but as there may be copyright issues it seems better to simply point you to the URL.

Date, don't you love him?

The rest of the column is devoted to a discussion of functions. In particular it concerns itself with the functions that exist, and can be created, to handle dates. The interest in dates was sparked off by the following question: *"I was asked the other day to display someone's age on an Access form, given their date of birth in the underlying database.*

"Eventually I came up with this line:

```
=IIf((Now()-(Now()
DatePart("y",Now())+1))+1>
([dtedob-([dteDob]
DatePart("y",[dtedob])+1)),
DateDiff("yyyy",[dteDob],Now()),
DateDiff("yyyy",[dteDob],Now())-1)
```

"Here, dteDoB is an Access date, the date of birth. Is there a simpler way of doing it?"

Simon Faulkner Simon@titanic.co.uk

A quick trawl of my hard disk revealed that this particular question had surfaced before in the column (*September 1994*). Way back then I was asked for a method of calculating age and came up with what you see in Fig 1. At that time I simply published the function as a solution. Now it seems a better idea to use this function as an excuse

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The Debug window

When you are playing with functions, a great trick is to use the Debug Window, as it is called in Access 97. In Access 2.0 it is a simpler tool called the Immediate Window. To reach it, you will find that a Debug button appears in the VBA toolbar as soon as you open a programming module. Just press it.

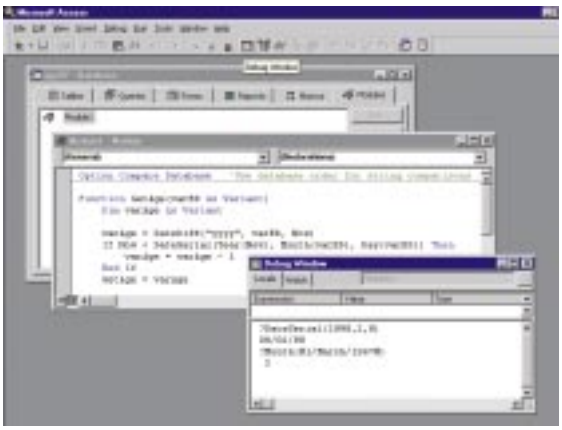
In the debug Window you can test functions. Try typing:

```
?DateSerial(1998,2,8)
```

(The ? character simply says "Print the value that comes back from the function".)

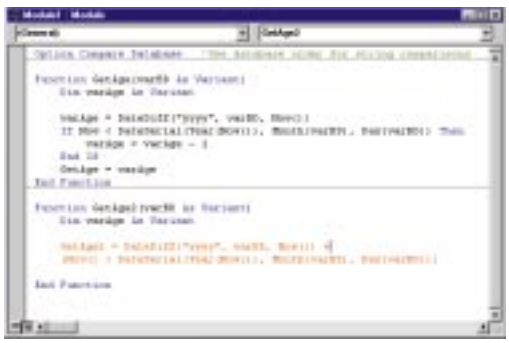
The window will return the value from DateSerial, in this case:

```
08/02/98
```



Using the Debug Window. You can use it to test the effects of the different date functions

The two GetAge functions. Note that part of the code is red: this is because I have split the line so that it all shows on the screen. Access won't run it in this state, but the copy on the CD-ROM should be fine. Note also that this code is *not* error-trapped; you would need to add that if you wanted to use the code for real



to look at Access functions in general and date functions in particular.

Functions in general

A function, in programming terms, is a device that returns a value. Typically, you give one or more pieces of information to a function, it carries out some calculations on that/those value(s) and returns some other information. In this case we want to give (or pass) to the function a date of birth. We want it to give back (or return) the current age of the person who has that date of birth.

Access Basic and VBA, like most programming languages, come with a whole variety of built-in functions. Of these, you will find that quite a few exist solely to perform apparently obscure manipulations upon dates, upon parts of dates, or even upon numbers which might one day be considered to be parts of dates. When I was little and just starting to learn about programming, I came across these functions and couldn't work out why they were all provided. The answer lies, of course, in the fact that no language can possibly provide every function a programmer will one day need. So the language provides a whole set of primitive functions from which more complex ones can be derived. An excellent example is this concept of "Age". Neither Access basic nor VBA, to my knowledge, has a function that will return a value which corresponds to an age in years when it is given a date of birth.

But we can build one using the more primitive functions.

In order to understand how this is done, you need some background about what some of the primitive date functions are up to, and that information follows. Remember that this is just a synopsis. If you want more detail, check in the online help.

Some date functions

1. Now() Returns a double-precision number which represents the current date/time. Now() assumes that January 1, 1900 has a value of 2 and works forwards from there. (Yes, I know that the value 1 sounds more logical for Jan 1st, 1900, but I'm sure there's a good reason why Microsoft chose 2. Does anyone know what it is?): numbers to the left of the decimal point represent the date; numbers to the right represent the time. I am writing this at about 6:50pm on 8/2/1998 and Now() is returning 35834.79.
2. DateDiff() Can work out the difference between two dates. You may be interested in the difference in years, months, days etc. and you tell DateDiff which one interests you by passing it a parameter. So, if you pass "yyyy" to DateDiff(), that says you want to know the difference in years.

The only problem, as Simon has noted, is that DateDiff is a crude tool and simply returns the numerical difference between two dates. Thus if you ask DateDiff() for the difference in years between, say, 14th May 1966 and 8th Feb 1998 it will return 32. While it is true that 1998-1966 = 32, it is also true that someone born on the first date will only be 31 years old by the second.

3. DatePart() Returns part of a date. Date Part("yyyy",Now()), for example, returns 1988 (the four-digit year part of the current date).
4. DateSerial() Returns a date if you give it a year, month and day as numeric values. Remembering that dates are stored as numbers, if you pass today's date to DateSerial() as three numbers — 1998, 2, 8 — it will return the double-precision number that corresponds to that date.

DateSerial is a great example of a built-in

Fig 2 Function with TRUE value as -1

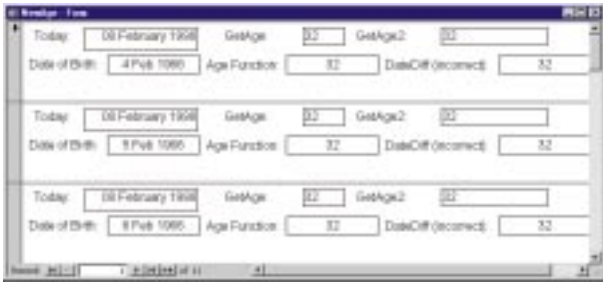
```
Function GetAge2 (varBD As Variant)
    Dim varAge As Variant

    GetAge2 = DateDiff("yyyy", varBD, Now) + (Now < DateSerial(Year(Now), Month(varBD), Day(varBD)))
End Function
```

date function that seems at first sight to be totally useless. If you give it 1998, 2, 8 it will return 08/02/98. Great. But it is really useful in the function for returning someone's age.

5. **Year()** Pulls the year value out of a date. In other words, if you give Year() the date #1/March/1967#, it will return 1967.

6. **Month()** Pulls the month value out of a date. In other words, if you give Month() the date #1/March/1967#, it will return 3.

7. **Day()** Pulls the day value out of a date in much the same way; in the above example, it will return 1.



The NewAge form. This screenshot was taken on 8/2/98 and you can see that the DateDiff function is not returning the person's age (and in fairness, it was never intended to do that job). Simon's solution (*see main text*) and the two versions of GetAge appear to be giving the correct answer

8. **Function GetAge (varBD As Variant)** This line tells us that GetAge is expecting to be passed a value (in this case, a date) which will be known within the function as varBD. Essentially this means that whenever you see varBD you can imagine a date, say, 14th May 1996.

```
Dim varAge As Variant
```

Set up a variable called varAge (which we will use to hold the age of the person).

```
varAge = DateDiff("yyyy", varBD,
Now())
```

Set the variable varAge to be equal to the value that DateDiff returns for the year difference between 14th May 1966 and Now() which is currently 8th Feb 1998. DateDiff obligingly returns 1998-1966=32 and so 32 is put into varAge. Not that this is *not* the person's age because they were born later than 8th Feb. In fact, their age is currently 32 – 1 = 1.

The next line:

```
If Now() < DateSerial(Year(Now()),
Month(varBD), Day(varBD)) Then
        varAge = varAge - 1
```

is complex at first sight. The apparent complexity lies in the bit:

```
DateSerial(Year(Now()),
Month(varBD), Day(varBD))
```

DateSerial() builds up a date from three values which it gets from the functions:

```
Year(Now())
Month(varBD)
Day(varBD)
```

In turn these functions can be expanded:

```
Year(Now()) – Year(8th. Feb. 1998)
```

- which is 1998

```
Month(varBD) – Month(14th. May
1966)
```

- which is 5

```
Day(varBD) – Day(14th. May 1966)
```

- which is 14.

So DateSerial gets these three values and builds a new date, 14th May 1998. Why do we want this date? So that we can compare it with today's date to see if this person has had a birthday this year. We do that comparison with the bit that reads:

```
If Now() < DateSerial(Year(Now()),
Month(varBD), Day(varBD)) Then
        varAge = varAge - 1
End If
```

which says: if today is earlier than the date we have just built, then the person hasn't had a birthday yet, so deduct one from the value you got using DateDiff.

This means that the value in varAge changes to 31, which is the person's age.

These two bits:

```
GetAge = varAge
End Function
```

ensure that the value we have calculated is returned by the GetAge function.

Simon was kind enough to supply his solution in a file called AGE.MDB and a form called fmAge. I have added a form called NewAge. NewAge makes use of the GetAge function and another one, GetAge2, which is more elegant but less readable.

This function in Fig 2 uses the fact that a TRUE value is the same as –1. The formula adds on the value of:

```
Now < DateSerial(...)
```

This statement is evaluated for truth and will return -1 if the current date is less than the birthdate passed to it.

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. Write to him at the usual *PCW* address (p10) or email him at database@pcw.co.uk

Divide and rule

If you want to fit a big fat drive, things can get complicated when you have to fight the joint conspiracy of BIOS and OS. Conquer the problem by getting your disk partitioning right.

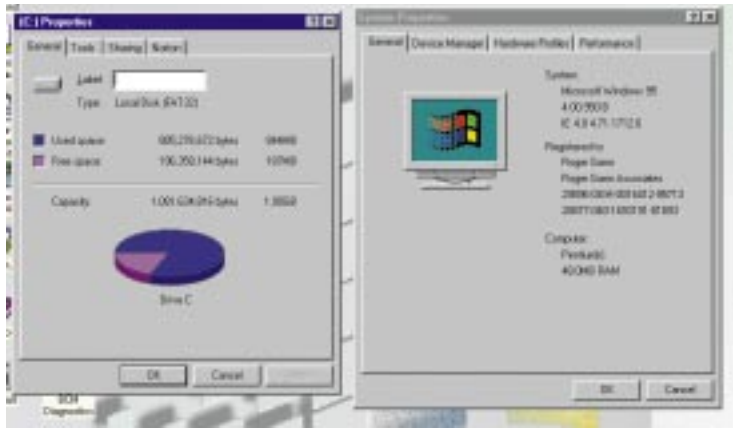
Installing a hard disk these days is no longer a big deal and is well within the capabilities of most PC users. However, things can get a bit tricky if you really push the boat out and try to install a hard disk larger than 8.4Gb. There are, in fact, two factors which conspire to prevent you fitting larger drives than this to your PC: the BIOS and the operating system. Luckily, neither problem is insurmountable.

The BIOS

In the little table provided in my April article, the first column detailed the normal BIOS limitations on hard-disk capacity which restrict support to drives with no more than 63 sectors per track, 255 heads and 1,024 cylinders. Multiply these numbers by the standard sector size of half a kilobyte and you get a capacity ceiling of 8,032.5Mb (approximately 8Gb). Such a limit is inherent in all BIOSes that use the CHS (Cylinder, Head, Sector) 24-bit addressing method. However, Logical Block Addressing (LBA) uses a 32-bit address representation and so can support larger capacities. An IDE drive can accept 28-bit addresses and so the capacity ceiling increases to a more reasonable 137.4Gb (228 x 512 bytes). For the past couple of years most PCs have supported LBA, but if you have an older "CHS" PC all is not lost.

Occasionally you'll be able to upgrade the BIOS to one that supports LBA via a free download from the PC manufacturer's web site, or you can use special translation drivers like OnTrack Disk Manager which are often bundled with larger IDE drives. But don't forget, BIOS restrictions only affect drives larger than 8Gb. If you're fitting a smaller drive, no probs — it's just the OS with which you'll have to contend!

The other major restriction comes courtesy of the operating system. Very early versions of DOS could address a mere 32Mb of data per hard disk — just as well because most users had 10Mb or 20Mb drives.



You'll need OSR2 for a FAT32 disk partition: right-click on My Computer and select Properties. If you're running OS2R you'll see Microsoft Windows 95 4.00.950B listed in the system area

It all began humbly with MS-DOS 2.0 which introduced us to a new utility called FDISK which allowed supported hard disks to be partitioned into a single 15Mb partition, using a 12-bit File Allocation Table (FAT). MS-DOS 3.0 supported partitions up to a 32Mb maximum, using a 16-bit FAT, allowing a smaller cluster size and more efficient disk usage. The 32Mb limit was a function of the FAT file system MS-DOS uses. This can contain 65,536 entries and each one lists the location of a particular 512-byte sector on the hard disk. So 0.5Kb x 65,536 gives us our 32Mb.

MS-DOS 3.3 introduced support for more than one logical drive per hard disk. (Logical drives are treated as separate disks under MS-DOS, even though they can occupy the same physical hard disk.) As well as a Primary partition you could also have an Extended partition which could be carved up into "logical" drives.

For a while there were several varieties of DOS in use, each with its own way of supporting large (i.e. <32Mb) partitions. The first "official" release of MS-DOS to support drives larger than 32Mb was MS-DOS 4.0. It did this by breaking the one-to-one relationship between a FAT entry and a disk sector, so if a FAT entry represented two sectors (a.k.a. a cluster or allocation unit) the capacity limit would be increased to 64Mb, 128Mb for four sectors and so on. However, to fully access these large drives required SHARE.EXE to be loaded, but hard disks continued to increase in size and soon this proved inadequate.

After eight

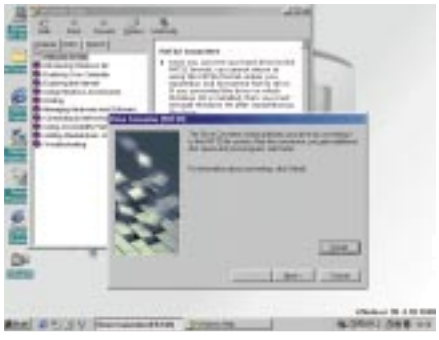
MS-DOS v5.0 and later support up to eight physical hard disks. Partitioning became standardised with this release of DOS and all subsequent versions have followed this standard (dubbed FAT16, thanks to its use of 16-bit entries) — Windows 95, too. Windows 95 actually introduced two slightly different partition types to specifically cater for the new breed of EIDE drives that supported Logical Block Addressing. But

the maximum partition size remained stuck at 2.1Gb: if you had a drive bigger than this, it had to be partitioned, with partitions limited to a ceiling of 2.1Gb. So, for instance, if you installed a 6.4Gb hard disk, its primary partition couldn't exceed 2.1Gb and the extended partition could occupy the remaining disk space. However, the logical drives carved out of the extended partition could not themselves exceed 2.1Gb in size, so in this example, with 4.3Gb remaining you could have a pair of 2.1Gb drives plus one 100Mb or some permutation thereof.

Microsoft's FAT16 regime allows partitions to be as large as 2.1Gb. You can have up to four primary partitions per drive, any one of which can in theory be bootable (it just has to be "active"), but only one extended partition. Even Windows NT 4.0, with its much-vaunted NTFS file system, is not immune from some of these problems: the first partition can be no larger than 4Gb in size, which means all drives larger than this must be partitioned.

My problems in installing either drive began much sooner than I had expected. For a start I had BIOS trouble, getting the PCs to correctly recognise the full capacity of the drives. Take one of my PCs, which has a fairly recent Phoenix BIOS 4.04 (a fairly respected BIOS). Whenever I tried to get the CMOS Setup to auto-recognise either of the new drives, it would actually lock up; something I've never, ever seen in a firmware-based setup program.

I had a little more success with an Elonex PC which used an AMIBIOS 1.00.04. This had no problems in recognising the 8Gb Maxtor but while it correctly identified the Quantum TX12, it claimed it was an 8Gb drive. This was because the Maxtor's capacity was a shade under the 8Gb BIOS ceiling, 8,016Mb rather than 8,032Mb. I had a near-identical problem with an AST Bravo LC PC: its AST BIOS correctly dealt with the Maxtor, which I was able to fully partition and format under MS-DOS 6.2. However, the Bigfoot TX12 was treated as though it were a 16Mb drive (!) under both FAT16 and FAT32. I had to use the supplied Disk Manager software in order to partition and format the drive.



The drive converter wizard

As well as having size limitations, FAT16 is a very inefficient file system and careless use of it can lead to a lot of wasted space on a large hard disk. If you didn't partition a 2.1Gb hard disk, DOS would allocate 64 512-byte sectors as the cluster size, meaning that the smallest space a file could occupy is 32Kb. On average a file wastes half a cluster, and with most modern PCs having literally thousands of files, this lost or slack space soon mounts up.

32-bit boost

Microsoft quietly released an updated version of the DOS file system, FAT32, in the OEM Service Release of Win95 over 18 months ago. With the introduction of FAT32, both the FAT entries and the sector numbering are now 32-bit. At a stroke, maximum disk capacities rocketed: 4,294,967,296 distinct 32-bit values multiplied by 512 bytes per sector yields a theoretical maximum disk size of two terabytes. It gets better: cluster size remains a mere 4,096 bytes for partitions up to 8Gb in size, so FAT32 is relatively space efficient.

FAT32 adds a few other improvements. The root directory on a FAT32 drive is now an ordinary cluster chain, so it can be located anywhere on the drive. This removes FAT16's previous limitation of 512 root directory entries. And, the boot record on FAT32 drives has been expanded to allow a backup of critical data structures, which makes FAT32 drives less susceptible to failure.

There are some drawbacks to FAT32 however. To use the FAT32 file system on an IDE drive, your motherboard or disk controller's BIOS must fully support logical block addressing (LBA) mode extensions for drives larger than 1,024 cylinders. The upper limit for a single partition under most SCSI configurations is 8Gb. For partitions larger than 8Gb on an IDE or SCSI drive, the BIOS must support INT 13 extensions. To use FAT32 you also have to upgrade your disk utilities and anti-virus software to compatible versions. Some older apps, including Microsoft Office 95 and 4.3, may not install properly under FAT32. What's more, FAT32 disk partitions cannot be seen under older versions of DOS, the original release of Win95 or NT 4.0. Dual-booting between FAT32 and the previous version of DOS becomes a no-no as well. And what you gain in efficient use of disk space, you can lose in performance: FAT32 can actually slow your PC down as it now has to hoover up many more clusters in order to load a file. If you had 32Kb clusters before, you'll now have four FAT32 clusters to load for every one previous FAT16 32Kb cluster, which is fine if they're contiguous but not so cool if they're fragmented to the four winds.

In short, it can be a lonely life with FAT32. Some power users keep a 512Mb FAT16 partition as their primary partition simply so they can boot from any DOS disk and still "see" at least some of their hard disk. If you need to boot older versions of DOS on a regular basis, then either forget about FAT32 or let boot drive C: remain as a FAT16 partition and install FAT32 on subsequent partitions. In this case you should be able to dual-boot into an old DOS 6.x on drive C:. However, like it or lump it, if you want to use the new breed of super-large disks, you'd better get used to the idea of embracing FAT32.

If you want to install a very large hard disk, one way or another you'll need FAT32. So where can you buy it? The answer is, you can't. Well, not by itself. It's only supplied on new PCs: the retail version of Win95 doesn't feature it. Even if you can get hold of an OSR2 CD-ROM disc from a friend, it's not an "upgrade" version and so cannot be installed over an existing Win95 installation. It's a blank disk or nothing!

Partitioning summary

Partition type	FDISK Reports	Size	FAT type	Introduced in
01	PRI DOS	0-15Mb	12-Bit	MS-DOS 2.0
04	PRI DOS	16-32Mb	16-Bit	MS-DOS 3.0
05	EXT DOS	0-2Gb	n/a	MS-DOS 3.3
06	PRI DOS	32Mb-2Gb	16-bit	MS-DOS 4.0
0E	PRI DOS	32Mb-2Gb	16-bit	Windows 95
OF	EXT DOS	0-2Gb	n/a	Windows 95

PCW Contact

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Master class

What's more powerful than many tape-based studios, cheaper and more flexible? VST, that's what. Steven Helstrip introduces Ian Waugh's VST master class, the first of a four-part series.

In this month's column we'll be finding out what Cakewalk V6 has in store and what it's like to get behind a virtual set of turntables with Mixman Studio. We also have news of the latest developments for Rebirth. But let's start with the first of a four-part series on mastering Cubase VST, with Ian Waugh.

VST master class

If you're thinking of upgrading to VST, perhaps from Cubase, what gear do you need and how do you get the best from it?

VST is capable of 32-track playback with 128 real-time EQs and two sets of four real-time effects. It's more powerful than many tape-based studios, much cheaper and inherently more flexible. Without doubt, digital audio is the recording system of the future, yet the potential of current software like VST far outstrips the capabilities of affordable hardware.

VST is essentially Cubase with direct-to-disk recording facilities and real-time effects. Forget these, and you can run it on a low-end Pentium — perhaps even a 486. However, the digital audio stuff needs lots of power and the minimum suggested system is a Pentium 100 with 24Mb of RAM, although the minimum *recommended* system is a Pentium 166 with 32Mb. This ought to allow playback of between 12 and 16 tracks. A Pentium 200 may manage up to 24 tracks but performance also depends on other parts of the system and how many real-time digital effects you are running.

Remember that VST was designed to work with Intel processors and although it should run fine with a Cyrix or AMD processor, this is not guaranteed. An MMX chipset should improve performance by ten to fifteen percent.

You will get better performance with a SCSI hard drive than with an EIDE drive, but do get an AV drive if you can because they don't perform thermal recalibrations during data transfer (which can cause a hiccup in the audio transfer). However, they do carry a price premium.

The drive should be as fast as possible, preferably with a 9ms (millisecond) average seek time or less, a sustainable data transfer rate of 7Mb/sec or more and a rotation speed of 5,700rpm or faster.

Store the digital audio data on its own drive if possible and, if you have two drives, splitting the audio tracks between them should also improve performance. Defragment any disks before using them for dtd (direct to disk) recording.

For high-quality audio you need a high-quality sound card, although VST should work with any MME-compatible card including "consumer" cards. The Event Electronics cards such as the Gina work well and Steinberg has had good results with Terratec, Multisound and MIDIMan

Top The Audio System Setup page holds all the major digital audio settings

Above It's important that Sync Reference and Card Settings are set correctly in order to optimise VST's digital audio performance

Making Music with Digital Audio

If you are interested in a broad range of digital audio applications, from learning the basics to mastering your own CDs, you might want to get your hands on a copy of Ian Waugh's new book, *Making Music with Digital Audio*.

You can find out what each of the leading music packages has to offer, learn more about digital effects processing, get to grips with direct-to-disk recording on the PC, and much more.

■ **Price** £14.95

Contact PC Publishing 01732 770893

cards as well as Creative's AWE32 and AWE64. Several users have reported problems with the AWE64, though. If you are one of them, the first thing to do is make sure you have the latest drivers — this goes for any card you use. For the latest Creative drivers go to www.cle.creaf.com/wwwnew/tech/ftp/ftpnew.html.

The AWE64's Wave Guide Synth/WG driver does conflict with the digital audio system. You must disable this to use the card with VST, so follow these steps:

1. Reboot your computer and make sure no programs are running.
2. Run the Setup MME program.
3. Look in the Outputs box for AWE MIDI Mapper and AWE64 Wave Guide Synth/WG.
4. Select them in turn, then click on the Set Inactive button.
5. Click on "OK" and try Cubase. If the audio still doesn't work, launch the Creative Audio Mixer and switch on the LEDs.

In order to achieve the best performance, the audio drivers and the audio system need to be optimally configured:

1. Open the Audio System Setup window. If you're using a "standard" sound card, the ASIO Device should be set to ASIO (Audio Stream Input/Output) Multimedia Driver. Other cards should come with an ASIO driver — check with the manufacturer and/or Steinberg before you buy.
2. Open the ASIO Control Panel and select the Input and Output devices you wish to use. If you have more than one device, the one at the top of the list will be used for the Sync Reference.
3. In the Global Settings area, Sync Reference is used to synchronise MIDI playback to the audio. The Sample Position setting is best. It reports the number of samples played to VST which uses the number to synchronise MIDI playback. It is the equivalent to synchronising to a sample-accurate external clock.

If your card does not support this, select DMA Block. DMA (Direct Memory Access) transfers blocks of data to the card and it's not as accurate. You need to select the correct buffer size so click on the Detect Buffer Size button.

Get the Card Options right, too. Select Full Duplex unless you only want to playback samples. If your card doesn't appear to work correctly with Full Duplex, select the Start Input First option. This starts the card's Input before the Output and it may help solve the problem.

The Open All Devices Before Start option is for multiple I/O cards. If you have one, this option is preferred, but deselect it if it causes problems.

The PC is a beast of many parts and there is no such thing as a "standard" PC. It is a fact that the same software running on similar machines may work fine on some but not so well on others. That holds true for VST, too, but one thing is clear: you need a fast and powerful system to get the most from it.

Cakewalk version 6

It doesn't seem that long ago since we looked at the first release of Cakewalk and it's now already in version 6. There are three tiers in this release, starting with Cakewalk Express and Home Studio for entry-level users, and Cakewalk Professional for more demanding applications.

The main focus in all three is the integration of digital effects processing, or the CFX Effects Pack which provides a collection of reverbs and choruses (although not real-time) and support for DirectX audio plug-ins. There are also graphic and parametric EQs equipped with common presets to tweak your mixes.

StudioWare, not available in Express, is the next significant addition and provides on-screen automation for MIDI instruments and other studio gear such as the Roland VS-880 (Fig 1).

Arranging in the main window has been

Fig 1 Cakewalk's StudioWare provides on-screen panels for synths and digital audio workstations like the Roland VS-880

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Fig 2 **At last, a TR-909 mod for Rebirth. Here's where all your techno dreams come true**

Fig 3 **Another Rebirth mod for the darker side of your imagination**

simplified and you can now have linked clips, which are basically clones of a master clip. When you go to edit MIDI data, changes are made in all the clips that are grouped. The controllers view and piano-roll editor have also been merged, enabling you to align controller and note information more easily — doesn't it seem as if with each release, Cakewalk becomes more like Cubase?

Express provides two tracks for audio and basic editing capabilities with notation printing thrown in for just £49. Home Studio has four audio tracks with a mix-down option and better editing and notation editors. Professional has it all: eight audio tracks, pro score editor, a full complement of sync options and more. All three versions have support for RealMedia, enabling both audio and MIDI files to be streamed across the internet.

Rebirth update

Following in the footsteps of ID software, Propellerhead has made available toolkits for users wishing to develop their own Rebirth modifications. And not only can you change the samples that form the rhythm section, you can alter the way the whole package looks.

When I first reviewed Rebirth, some eight months ago, I was astounded that the TR-808 was implemented and not the TR-909, given that the latter has been pivotal to so many dance genres. Well, it was always going to happen and now it has: one of the first "mods" available is the TechnoBox TR-909e (Fig 2). The 909 implementation is complete down to every sample but don't expect faithful representation of the tonal and decay parameters — these are based on the 808 model.

Another mod worth knowing about is the PBE, or Pitch Black Edition (Fig 3). This should appeal to the darker side of your music creations, with heavy industrial sounds and a rough-and-ready mix of hardcore drum and bass samples just waiting to be fired up.

An original Rebirth CD is required to run these modifications and they can be obtained from www.propellerheads.se/mods/index.html.

Mixman Studio

Mixman Studio is a sample-based sequencer that enables you to create royalty-free tunes from a vast collection of professionally-recorded musical clips, called elements. Hidden behind what is probably the world's most straightforward interface lies a neat 16-track studio that features some high-end gizmos like pitch-shifting and auto time-scaling. As in previous versions of Mixman, songs are created by piecing together elements from the CD.

Get behind those decks and you could find yourself remixing one of the latest dance tunes

There's a good choice of dance-orientated styles from which to choose, including hip-hop, house, techno and acid jazz. An element could be a bass line, drum loop, a vocal or an entire orchestral passage. And you aren't just limited to what's on the CD: you can import your own wave files and even record a vocal take over the top.

You might go about making a song by first laying down a rhythm track, then spend some time jamming over the top using keys to trigger elements. When you're onto something, you can slot the pieces together to make an arrangement. While a song is playing, you can "drop-in" elements over the top and solo/mute any part. Word has it that, in the near future, several record labels will be releasing enhanced CDs to provide audio tracks and their constituent parts in Mixman format.

Remixing the latest dance tunes has never been so easy and you don't need to be a studio whizz-kid to get great results. You just need an ear for what sounds good.

■ **Price** £39.95
Contact Time + Space 01837 841100

PCW Contacts

Steven Helstrip and **Ian Waugh** can be contacted at the usual *PCW* address (p10) or via email at **sound@pcw.co.uk**

Cakewalk: Express £49; Home Studio £99; Professional version £199. Available from **Et Cetera Distribution** 01706 228039

Acrobatic display

Ken McMahon takes a long hard look at Acrobat. With this active software you can create electronic versions of your pages for emailing or for use on the web. It's quite a show.

This month I want to take a fresh look at Adobe Acrobat, cross-platform portable document software. It lets you create electronic versions of your pages that can be viewed by anyone regardless of hardware platform, OS, applications software or fonts.

A PostScript-based format is used, called Portable Document Format (pdf). All the viewer needs is the Acrobat reader (available free from Adobe's web site). The advantages are that you don't waste paper on hard copies, you can email files quickly and cheaply, the recipient can forward them to colleagues and back to you with Post-It note comments on them, and it's simpler and cheaper than colour lasers.

Fancy that!

Acrobat is based on Adobe's Multiple Master font technology which creates on-the-fly copies of unavailable fonts. It puts layout accuracy first and foremost, so your linebreaks will be exactly as they were in the original, although any fancy fonts you may have used may look a little plainer than you'd expect. If you can't bear for this to happen, you can embed the fonts, although you'll pay a penalty in increased file sizes.

Acrobat 3.01 for Windows includes the Acrobat Reader; Acrobat Exchange, a pdf editing package; Acrobat Distiller, for creating pdfs from PostScript files; Acrobat Catalogue, for creating searchable text indexes; and an Acrobat Capture plug-in with OCR for creating pdfs from scanned paper originals.

There's also pdf Writer for creating pdfs directly from word-processing software. It's ideal for converting paper-based publications for online use, with the minimum of effort. Adobe recognised this early on and has worked hard to expand and improve Acrobat's online features. There's a growing number of web sites with pdf content that can be read online from within your browser. According to Adobe, more than a quarter of a million web sites now deliver pdf documents and more than 20 million people have downloaded the Acrobat reader.

Multimedia authoring

With the addition of interactive forms and dynamic controls (interactive buttons that trigger QuickTime or AVI movies) Acrobat has become a useful multimedia authoring tool. Let's suppose you've just completed your annual report and want to make it available on the company's intranet or publish it on a web site. First, breathe a sigh of relief that you don't have to go anywhere near HTML, then open up your document in the application which created it. It's a three-step process. First you create a PostScript file by printing to disk using the distiller ppd in place of your usual printer. The next stage is to distil the document (this creates the pdf). Third, you need to do a bit of quick editing in Acrobat Exchange.

1. Make sure your document will fit on the page. If it's A4 print, it spreads on A3 landscape paper at 70 percent with crop marks. If this is your first attempt and it's a big document, make a test run with the first few pages. Big, picture-heavy documents can take a while to distil and if there's a problem you'll have to start again from scratch.
2. Open distiller and set the job options. My advice is to go for as much compression as possible. Most people would rather see a poorer-quality picture quickly than wait forever for something better to download. You can experiment with the JPEG settings to see what kind of quality gain you get and what you have to pay in terms of increased file size (Figs 1 & 2).

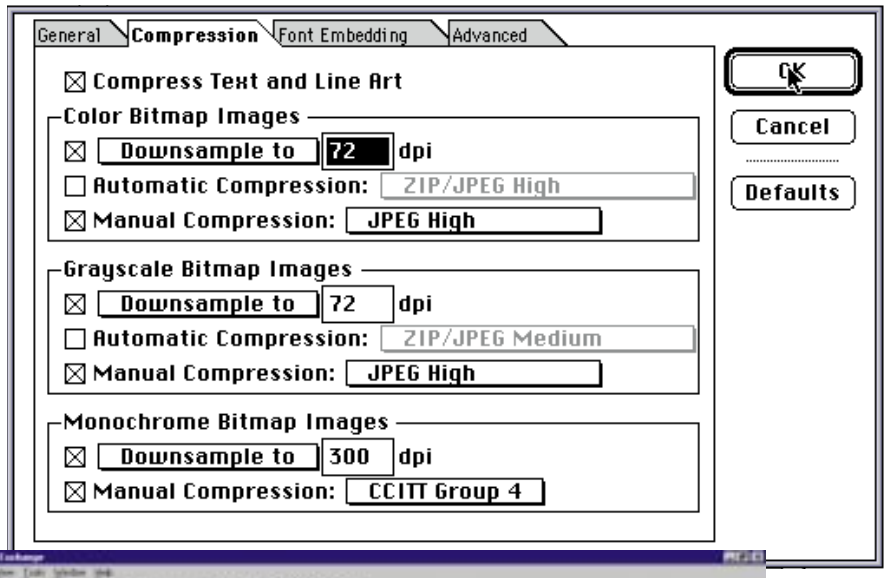
I've distilled the examples in Fig 2 from a 4.9Mb PostScript file using both the highest and lowest JPEG setting for colour pictures to give you an idea of the size/quality trade-off. The pdf on the left in Fig 2 (shown at 200 percent) has been created using the low setting (the setting refers to the degree of compression and therefore higher quality) and the one on the right by using the highest JPEG compression option. As you can see, the difference in quality is marginal and wouldn't be noticed by someone viewing the file at 100 percent unless they looked closely. The difference in file size? The higher compression results in a 129Kb pdf against 323Kb with the low setting.

3. Once the distillation process has finished you can open the pdf in Acrobat Exchange. Don't forget to throw away the PostScript file (they tend to be big, so if you leave them lying around they will eat up disk space).

Patchwork demonstration

To demonstrate Acrobat's versatility I've created these pdfs from a Quark file using Distiller 3.0 on a Mac and edited them in Exchange 2.1 on a PC. It probably represents the patchwork nature of most people's setup and only cynics would suspect it has anything to do with the chaotic nature of my Acrobat installation. If you think your files might be viewed by people using 2.1, make sure to select 2.1 compatibility from the job options general tab (3.0 uses file compression that is not backwards compatible). Exchange allows you to carry out editing on the pdf (Fig 3).

You can't redo the layout but you can make minor corrections, change the order



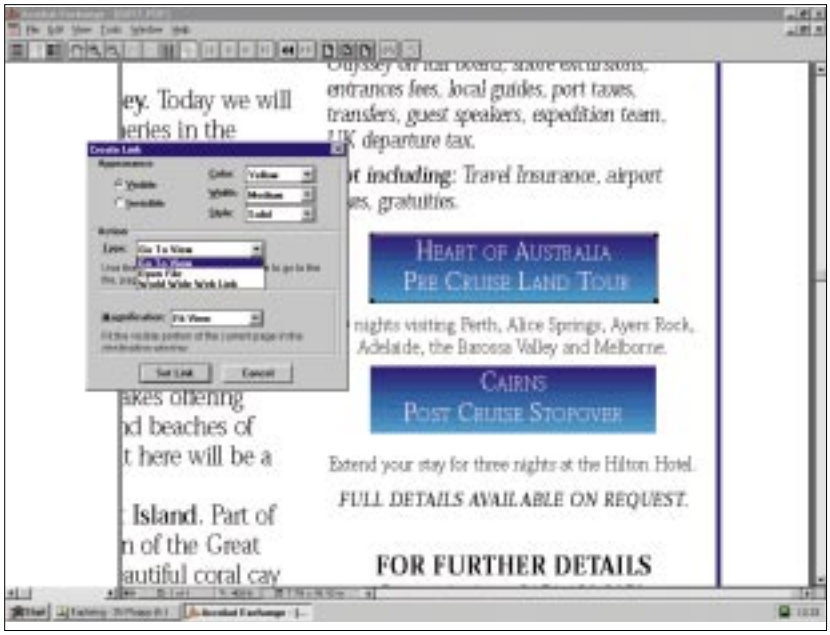


Fig 1 (top) Adjust the JPEG settings to test quality gain

Fig 2 (middle) The difference between the highest and lowest JPEG settings

Fig 3 (above) In Exchange you can edit on the pdf

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of the pages, crop and rotate them, add hypertext links and set security preferences. You can add thumbnails and bookmarks and, in 3.01, create dynamic controls and java-enabled forms. Time spent adding these things makes the difference between a feature-rich online presentation and a quick conversion job. Adding hypertext links to the contents page can make the difference between someone giving up on the first page and delving further.

For more information on Acrobat check out its web site at www.adobe.com. If you have Acrobat 3.0 you can download a 3.01 upgrade and the forms plug-in.

The Acrobat Talk List at www.blueworld.com/lists/Acrobat is a list for discussion on topics related to Acrobat. It is maintained by Blue World Communications and sponsored by Adobe.

Two chips for a tenner

Paul Bunyan has some advice for RG Mackenzie-Bell (*Q&A, March*) who wanted to know if upgrading his graphics card would improve his scanning and printing (to which the answer was a qualified no). Paul says the Cirrus GD-5446 PCI card takes a two-chip RAM upgrade which costs a mere tenner. With 2Mb on board he manages a respectable 1,024 x 768 in 16-bit colour, good enough for photoretouching. He doesn't say whether there's a 4Mb upgrade, but if you must have 24-bit colour you could drop the resolution to 800 x 600.

PC output bureaux

A while ago I promised I'd start compiling a directory of PC output bureaux and asked for contributions from anyone who had used, or knew of anywhere that provided, such a service. The response has not been overwhelming and, to date, I've had an email from JJ@softrax.co.uk plugging the services of West London Bureau Pollyprint (see "PCW Contacts"). JJ says Pollyprint doesn't look down its nose at PC customers and provides a comprehensive service including film output and colour lasers from applications including Quark XPress, Adobe Illustrator, Photoshop, CorelDraw, Ventura, MS Office, MS Publisher and eps. My contribution is ABC, also in London, which provides a professional output service including film and bromide output, lasers, scanning, large-format inkjets, 35mm slide output and OHPs. Its price list has useful advice on preparing files for output.

What about the rest of the country? I can't believe there are only two PC output bureaux in the UK, so let's hear from you!

Questions & Answers

Q I would like to use the Desdemona typeface with Word97, but it is an outline font. Do you know of a method of downloading a few characters, to form the word "Millennium", say, and then filling in the middle of each letter?

A If you've got a vector-drawing package like Adobe Illustrator or CorelDraw, just type in the text using the text tool, then, making sure the text object is selected, choose convert to outline paths. Next, select the letterforms and apply whatever stroke and fill values you want, in the usual way. If you don't have a vector-drawing package you can do the same thing in a bitmap editor that supports text. Type in your word, select the interior of the letterforms using the magic wand tool and fill with the desired colour. This method won't produce scaleable type so make sure you use a high resolution to avoid jaggy edges. If your application supports it, select anti-aliased type and use a greyscale mode, not bitmap, even if your type is black on white.

Q I have been using the excellent Lucinda Casual font which I copied from the *PCW* CD-ROM. Unfortunately, having discarded the CD, I lost the font when formatting my hard drive. Could give me information about obtaining it?

Hugh Bonsey

A You can get Lucinda Casual from www.waughs.com/jason/fonts/l.html, the truly weird Waughzoo web site of the Waugh household of Cincinatti. Jason Waugh's font library holds hundreds of TrueType fonts, including Lucinda Casual. I am assuming that these are all public domain and, if so, we'll put Lucinda on next month's cover-mounted CD-ROM, along with a selection of other public domain TrueType fonts.

Where's the connection?

Peter Stevens responded to my suggestion (*Q&A, March*) about emailing his large files to a service bureau: "*Amazingly, this often cannot be done. While many Mac-based bureaux have ISDN this is not a normal email (i.e. net connection), it merely allows the transfer of files between two Macs. It seems incredible that someone would pay for an ISDN line and not have net access through it, but this seems quite common.*"

It's true that bureaux use ISDN primarily for Mac-to-Mac file transfer, but that doesn't prevent them from using it for net access too. I use my ISDN connection for sending Mac files direct to bureaux and for internet access via both Mac and PC.

BT has recently announced an affordable "domestic" version of ISDN which doesn't require the installation of a dedicated line: a box plugs into your existing analogue socket, providing an ISDN connection and a through-connector for the existing line. If BT sticks to its promise, affordable ISDN could be with us before the end of the year.

Hermstedt and 4-Sight control the market for Mac-based ISDN file transfer and, as far as I am aware, 4-Sight doesn't have a PC product under development. Hermstedt, however, has Leonardo Da Windows, which works in conjunction with its Leonardo range of ISDN terminal adapter cards or any other PC ISDN card. I've been using an Eicon Technology Diva 2.0 card which cost about £100 and has worked perfectly.

Whether you're using ISDN or a 14.4Kbps modem, sending graphics-intensive files down phone lines can be a slow business and file compression is one way to speed it up. I'll be looking at compression options in the near future, so if you have any questions or observations, I'd be glad to hear from you. I'd appreciate it if you could limit the size of any emails to two megabytes.

Oops! A hard fact about Softy

So taken was I with Dave Emmett's Softy font editor (*March issue*) I started inventing features it did not have. It *won't* handle Adobe Type 1 fonts, only TrueType, but I still recommend you check it out at www.home.iclweb.com/icl1/d.w.emmett. If you have connection problems do persevere: the server seems to be somewhat erratic.

PCW Contacts

Ken McMahon can be contacted by post c/o *PCW* at the usual address (p10) or via email at graphics@pcw.co.uk
ABC 0171 278 5004
abc.graphics@btinternet.com
Pollyprint 0181 597 1441, sales@pollyprint.co.uk or www.users.dircon.co.uk/~polprint

The eyes have it

You can forget the silly 3D glasses, Benjamin Woolley has seen the future for himself and it's phenomenal: 'autostereoscopic display technology' is 3D image projection on a flat screen.

A few weeks ago I found myself in an old church on a dark winter's night, and I beheld an apparition: the image of a man. The man was normal enough and I was looking at a picture of him displayed on a perfectly flat LCD screen — *yet he appeared in 3D*. Miraculously, the three-dimensional effect was reproduced without my having to wear any sort of funny headgear or eyeglasses!

You would normally expect to see visions of a more spiritual kind in a church, but this one had been deconsecrated and turned into the HQ of Reality Vision, a small British company which specialises in the development of 3D or, as they prefer to call it, "autostereoscopic" display technology.

The company's founders, David Traynor and Edwina Orr, were demonstrating its latest prototype at a meeting of the London Virtual Reality Group (LVRG), having kindly donated the converted church as a venue. I was there as one of the meeting's speakers. Also present was the excellent, invigorating Tim Regan, who is in charge of the "shared spaces" experiments being undertaken at BT's research labs at Martlesham in collaboration with the TV production company Illuminations, for BBC2's *The Net* and Channel 4's *Heaven and Hell*.

Autostereoscopic screens are, in a sense, the holy grail of 3D display: a flat screen which can display a 3D image without the viewer having to wear any special equipment. It is different from the holy grail of full-blown holography, the sort of thing you see in futuristic films like Star Wars which project a complete 3D object into a space as though it was physically there.

There are various experiments under way to achieve this but there are severe technical limitations that, according to David Traynor, make it a tough technology to crack. For example, Traynor claimed that the resolution of holographic images is equivalent to 5,000 lines per millimetre (compared with a few hundred in a high-resolution photograph) which means that you need supercomputers to manipulate them. Still, it may happen.

Meanwhile, we have a number of prototype technologies based on the less ambitious concept of "autostereoscopy" being touted by companies around the world. Reality Vision's own "Full Parallax Autostereoscopic Display using Holographic Optical Elements" is, as the church demonstration showed, up and running. And, on the basis of my own brief experience, it looks promising. The image I saw was of a man stretching out towards me, his hand seeming to reach through the screen. It was an odd experience, my eyes having difficulty knowing what to focus on.

HOE it's done

Autostereoscopy is, as its name suggests, technology that uses stereoscopy, which will be familiar to anyone who has watched a film wearing those silly cardboard specs with different-coloured lenses.

The basic principle is that when we look at the world we recover depth information from what we see by unconsciously comparing the slightly offset views our right and left eyes perceive. If you substitute your eyes for cameras, you get two pictures which are similar but with the same slight offset. If each eye then looks at each respective image, you will recover the same depth information you would have seen had you been there in person.

That's the theory. It works in practice by projecting both images on top of each other on a screen and giving the viewer a pair of glasses which filters out the right-hand image so that it is only seen by the right eye, and the left-hand image so that it is only seen in the left. But glasses are inconvenient and can cause eyestrain.

This is where the "auto" bit of autostereoscopy comes in. Reality Vision has come up with a technique that is based around a standard LCD screen. LCDs act like transparencies, with a backlight — in the case of laptop LCDs, or reflected light in the case of most palmtop LCDs — illuminating the image they form. The Reality Vision system replaces the backlight with a matrix of Holographic Optical Elements (HOEs) which "diffract" the light coming from a single light source behind (Fig 1). How exactly the HOEs do this is a matter of complex optics, but take my word for it, they seem to do the job.

Head start

One of the problems with autostereoscopic displays, as opposed to stereoscopic ones relying on some form of headgear, is that if you move your head the stereoscopic effect almost instantly disappears.

Reality Vision's solution to this problem is based on the fact that the position of the light source behind the HOE matrix determines the position of the stereoscopic viewing area in front. So, by tracking head movements and moving the light source accordingly, the effect can be maintained dynamically from any viewing angle. Furthermore, if you add more light sources, each one being tracked, you can have several people looking at the same stereoscopic at the same time (Fig 2).

As for the model demonstrated at the LVRG meeting, the tracking was carried out

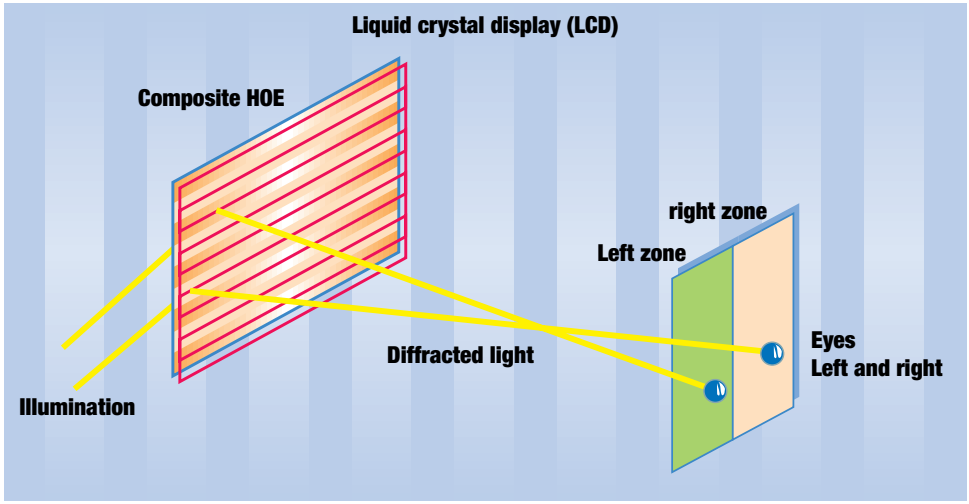


Fig 1 A simplified diagram of how the display works

using a lightweight Perspex crown which was monitored by a detector on top of the screen. So, some form of headgear is still necessary, at least for the moment, but it doesn't get in the way of the image.

Reality Vision is looking for manufacturers to license the technology and is talking to a number of firms. Traynor says that, so far, most of the interest has come from Japan but he is keen to talk to European companies. Whenever the first models appear, and whoever makes them, they will be relatively costly, but that is largely because they will use large LCDs which are, as we know, horrendously expensive. The rest of the technology, including the HOEs, is relatively cheap.

Such devices would certainly be a boon for complex 3D graphics applications, making it a lot easier to figure out the geometry and position of intricate scenes. But Traynor did not know when autostereoscopic displays will appear on the market. I'm afraid it's a case of that old journalistic cliché, time will tell.

Designated drivers

Last month I took delivery of my new, extremely powerful 300MHz Dell PC, the replacement for my clapped-out Compaq which will serve out its retirement grazing on my tiny render farm (three computers so far). It came complete with an AGP slot with a Matrox Millennium II card plugged in, and the promise of instant renderings and running the display at high resolutions in true colour.

With any new system the improvements it promises are dependent not so much on the hardware but on the drivers that will determine how well your software will run on it. With 3D, this means having a driver for the graphics adapter that is well written and supports the widest range of graphics standards on the widest range of operating systems. In this respect I chose poorly, as the Millennium driver, unlike the one for the Diamond File GL 1000 in my Compaq, has no support for Open GL under Windows 95 (Matrox told me support may be included in the Windows 98 version).

Matrox's excuse for this omission is that Win95 does not include full support for Open GL. This is partly true, although support in the form of a DLL has been there since the release of OSR2 and now a number of Win95 programs, such as SGI's VRML browser Cosmo, can exploit it. Furthermore, there are many things that OpenGL, a sophisticated graphics API which offers high levels of accuracy, can do that Win95's built-in API, Direct3D, cannot. So I was a bit disappointed, even annoyed, with the Matrox card.

However, a development which took place at around the same time could make such irritations a thing of the past. At the beginning of this year Microsoft and SGI shocked the industry by announcing that their respective graphics technologies, OpenGL and DirectX, would be combined, creating a single, unified architecture for graphics on the PC. The new standard has been codenamed "Fahrenheit" and will cover the gamut of graphics "from low-level APIs to full-blown scene graphics with large model visualisation", as graphics analyst Jon Peddie put it in the SGI announcement.

It should mean that, within a few years, companies like Matrox will have no excuse for offering anything other than high-quality drivers which provide the maximum functionality, available on all platforms. This is excellent news, a rare instance of sensible co-operation that could benefit all of us.

■ *A Reality Vision paper given to the UK Virtual Reality special interest group on its autostereoscopic display technology can be found at* www.brunel.ac.uk/~empgrrb/VRSIG97/proceed/008/hasdpape.htm

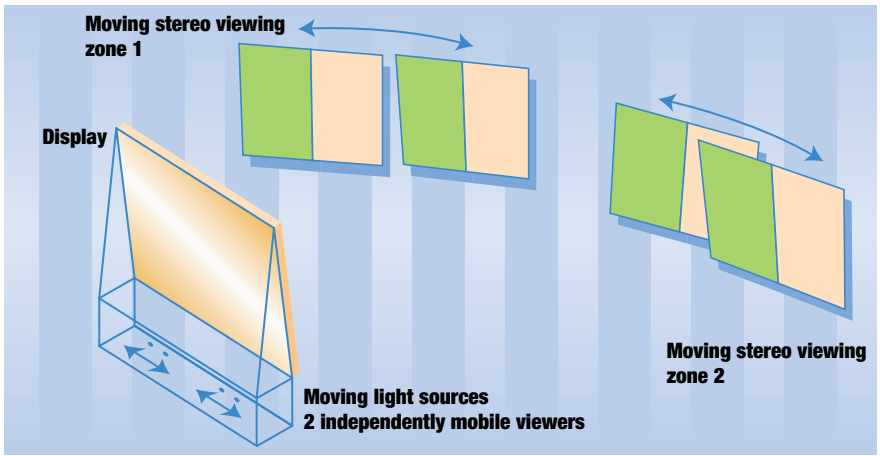


Fig 2 A diagram of a display designed for two people, the green half of each panel representing what would be seen by the left eye of each viewer, the red half by the right eye. A tracking device would independently monitor the movement of each person viewing the image, and move each of the two light sources correspondingly

PCW Contact

Benjamin Woolley can be contacted by post c/o *PCW* at the usual address (p10) or via email at 3dgraphics@pcw.co.uk

It's **not** what you've got...

…it's how you use it. The best development tool won't necessarily help you achieve a successful project, argues Tim Anderson: careful project management is the key.

Judging by my email, everyone wants to know which is the best development tool. But the answer is never straightforward because of the diversity both of tools and projects.

What some people do not realise is that the choice of development tool is secondary. Projects mostly fail because of problems with management rather than tools. Another common scenario is a solution which works initially, yet proves impossible to maintain or enhance as needs change. Sometimes the reason is simply that the developer has moved on and nobody else understands the code. Other problems are bug reports or change requests that get lost or are never implemented. Successful development is thus largely a result of successful project management rather than the use of a great development tool.

There are steps you can take to tackle these problems, and one is to use a version control system. A common misconception is that version control is only worthwhile for development teams or large projects. In truth, every developer practises version control and using dedicated software is useful even for a one-man project.

Imagine, for example, that your Widget Pro application is complete and working fine. You are working on version 2.0 but dealing with minor problems in version 1.0, simultaneously. Any changes you make to version 1.0 need to be made in version 2.0 as well, but not vice versa.

Another issue is that you have an experimental version of the user interface that might not make it into the release version. You need to test the experimental one but also need the ability to go back to the original. Soon, your hard disk is littered with directories called "widget trial", "widget buggy" and "widget backup" or whatever. This is exactly the kind of scenario with which version control software can deal, whatever the size of the team.

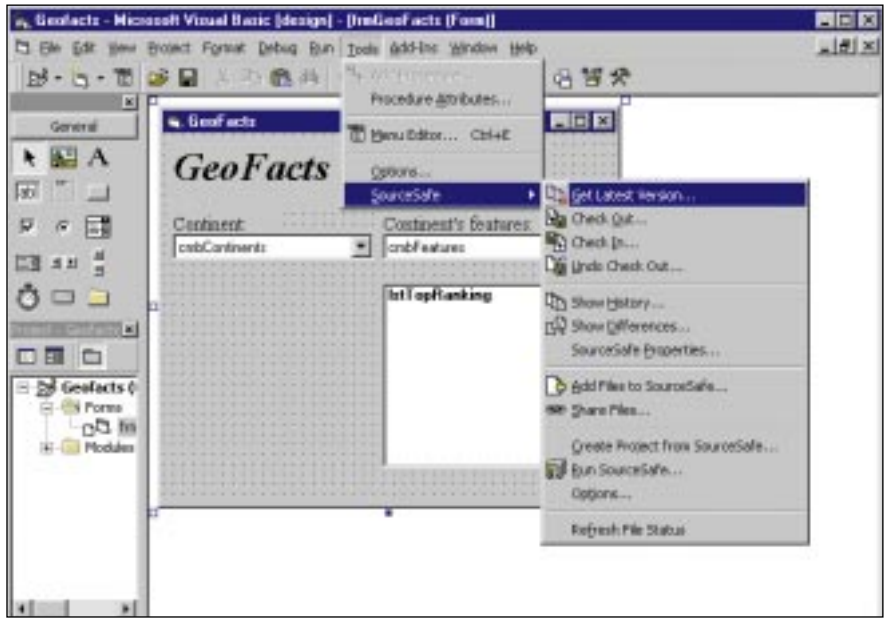


Fig 1 Visual SourceSafe integrates with Visual Basic 5.0 so that these options appear in the Tools menu

Visual SourceSafe

If you have Microsoft's Visual Studio, you already have a version control system. Visual SourceSafe is Microsoft's product (Fig 1) and works well. It consists of a central source code database and a client Explorer application. There is also an administration utility which lets you edit the list of authorised users.

When you add a project to SourceSafe, it makes a copy of the source files and stores them in its database. The idea is that each developer on the team has their own working directory and can check out the source files in order to work on them. Once checked out they are unavailable to other developers. If this is too restrictive you can immediately check the file in to make it available to other developers, but continue working on the local copy. When it is time to share your work, you can check it in again.

If the master copy has been edited by someone else in the meantime, you can use the Visual Merge editor for resolving conflicts. A strong feature is that Visual SourceSafe is integrated with Developer Studio, the IDE used by Visual C++, Visual J++ and Visual InterDev. It also hooks into the Visual Basic and Visual FoxPro IDEs, so covering most Microsoft tools. You can use it with Access 97 as well, but only if you have the Developer Tools version of Office.

Books for visual programming

Active Server Pages Unleashed

by Stephen Walther

Microsoft's Active Server Pages are a cheap and easy way to set up a web site with server-side processing including features like dynamic database access, provided that you are working on an intranet or with a service provider that supports this technology.

Here is a tutorial aimed at web-programming beginners. It tackles everything from basic HTML and scripting, through to building server-side DLL components with Java or Visual Basic. There is plenty of good advice but hundreds of pages are devoted to topics that are already well covered elsewhere, like basic web page authoring, leaving insufficient space for the topic that is meant to be the subject of the book. For example, Microsoft Transaction Server gets only ten lines while the general introduction to HTML gets over 100 pages. I would happily have done without the chapters on Microsoft Music Producer or Web Site Promotion in exchange for more detail about web database programming. This title will get you started with Active Server Pages, but no more.

Price £46.95 (including CD)
Contact Computer Manuals 0121 706 6000
www.compman.co.uk

Visual Basic 5 Development Unleashed

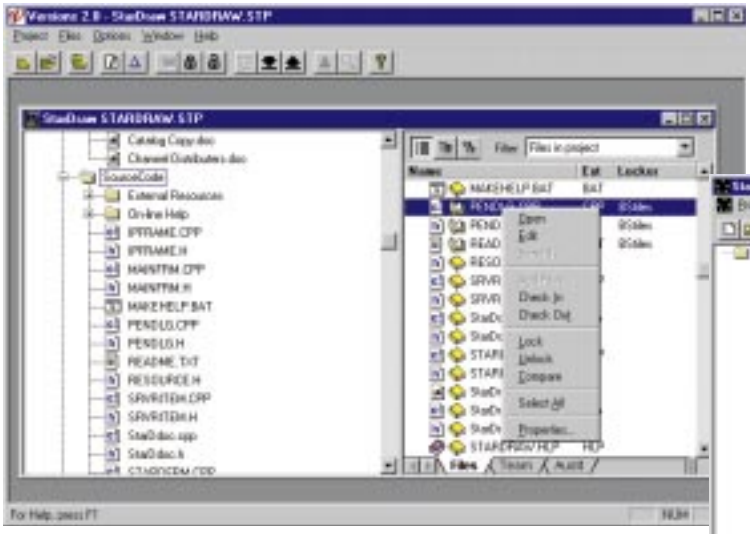
by A Hobbs *et al*

This is a book with well planned, targeted content. There is nothing whatsoever about Do…While loops or how to place a button on a form. Instead, the authors kick off with an introduction to object-orientated development with VB, including how to use Visual Modeler to design an application.

The next part of the book is devoted to ActiveX with a focus on web development. Part three is about database development, the emphasis being on using SQL and ODBC. An excellent section on advanced topics follows, with chapters on the registry, creating add-ins and wizards, and performance optimisation. Finally, Part 5 covers the setup wizard, help workshop and Visual SourceSafe. This last chapter is subtitled "A necessity for serious developers".

Here is a title which can be recommended to competent VB programmers who want to move on by exploiting the new features of version 5.0. It is a shame that it has appeared so late after the release of VB 5.0, as it forms a valuable supplement to the official documentation.

Price £32.95 (including CD)
Contact Computer Manuals 0121 706 6000
www.compman.co.uk



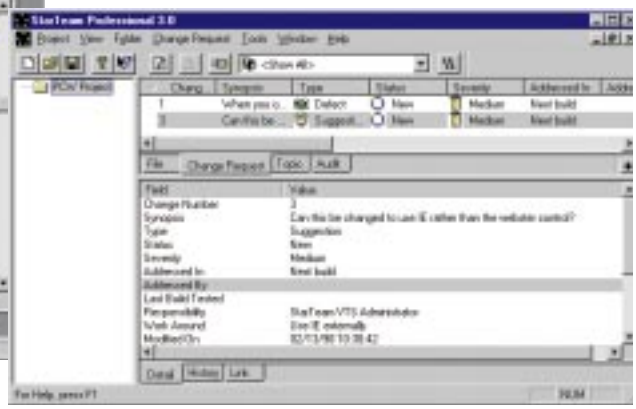


Fig 2 (left) StarBase Version 2.0 offers basic version control in an easy-to-use budget package
Fig 3 (below) The StarTeam client includes a list of change requests which can be linked to source files or discussion entries

It works less well with Access because project elements like VB code and Access reports are stored in a single MDB file. SourceSafe has to perform behind-the-scenes trickery to manage this and it can cause problems.

Even a developer working alone should use Visual SourceSafe or an alternative version control system. One advantage is that each time a file is checked in, you can add comments that describe the changes. Better still, it tracks the changes so you can view an earlier version or roll back to it if necessary. You can also apply a label to all files in a project, identifying a significant build or milestone.

Another great feature is the built-in difference, or merge, editor. The two are similar except that the merge editor shows the resolved file in an additional pane. The fact that version control forces you to always work on a copy of your source code is worth the small amount of extra work.

StarBase version control

Another choice for managing your source code is one of the products from StarBase. Version 2.0 is a budget-priced package (Fig 2) which has been around for a couple of years. StarTeam Professional 3.0 (Fig 3) is a new high-end product which I looked at in a late beta version.

There are many similarities with Visual SourceSafe. Like its competitor, the StarBase package has a central database of source files, the ability to manage users and also to check out files and mini-applications for comparing and merging different versions of the same file. Even the budget version 2.0 is a capable product that works over a network. The main

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Questions & Answers

Q I have created a form in Delphi to collect data from the keyboard. It has a number of edit boxes on it and I want to be able to pass control from one box to the next as the user hits the enter key. At present, to move from one edit box to the next, the user needs to press the tab bar. One way around this would be to write some code which checks each character as it is typed, but this does not seem very elegant. Is there another way?

Steve Jones

A You can easily do this by writing a line of code for the KeyPress event as shown in Listing 1 (see also, Fig 4). It may seem inelegant to check each character as it is typed, but you will not find a noticeable performance loss doing this. Windows executes a horrific amount of code in response to the simplest of actions in any case, so your small contribution will not matter much. With longer KeyPress procedures, the trick is to ensure a quick exit from the procedure if the key pressed is not one in which you are interested.

Q In defining my own procedures and passing variables between them, I would like to be able to use variables whose scope is local to the controlling and sub-procedures.

For example:

```
onbuttonclick
begin
do_this_proc (value);
do_this_proc (another value);
end;
procedure do_this_proc (variable);
```

Could you advise me and give sample code to show how to do this?

John Sharland

A This is easy in Delphi, even though the technique is not presented prominently in the documentation. If you look at the VCL source though, you will see it used a lot. It is a matter of placing the sub-procedure in the declarations section of the controlling procedure (using your terms). See Listing 2 for an example.

Note that the nested procedure doesn't appear in the interface section of its unit. It is entirely local to the containing procedure. You can even nest further procedures within the nested procedure. This is a great way to shorten and simplify your code if you have repetitive code within a procedure, although too many nested blocks of code may make it hard to navigate.

An important point to note is that local variables can be declared before or after the nested procedure. If they are declared above it, they are visible to the nested procedure, but not if they are declared below. Of course, you can also have declarations in both places for complete control over visibility, even within a procedure.

Listing 1 Trap the KeyPress event

```
procedure TForm1.Edit1KeyPress(Sender: TObject; var Key: Char);
begin
if key = chr(13) then Edit2.setfocus;
end;
```

Listing 2 Scope of procedures

```
procedure TForm1.Button1Click(Sender: TObject);
 procedure do_this_proc(myparm: integer);
 begin
 showmessage(inttostr(myparm));
 end;
begin
do_this_proc(1);
do_this_proc(2);
end;
```

Another way to print a memo

Referring to a question about printing the contents of a TMemo object (*PCW March*), Neil Howie has a quicker solution: *I've read your answer in PCW to the problem of getting a quick print of memo text. Bearing in mind that all true Pascal i/o takes place in files, how about:*

```
Memo1.Lines.SaveToFile('prn');
```

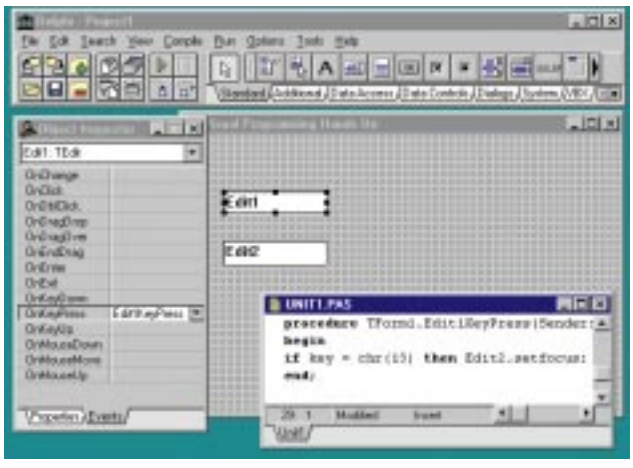

Fig 4 Trap the KeyPress event to customise the data entry in Delphi

Q With MFC or VB is it possible to globally subclass a window in order to get it to look and behave differently (e.g. add another button to the title bar)?

Jon Mulligan

A Yes, it is possible, but it depends what you mean by "global". In 16-bit Windows you can easily use global sub-classing to change the behaviour of every window of that class in the system. But this is anti-social programming and is discouraged. In 32-bit Windows class information is kept separately for every process, so the equivalent code will only affect the windows used by your application. This is generally a good thing, unless you really want global to be global. There are techniques to do this, such as using an APPINIT_DLLS entry in the registry to add a dll to every process. But again, this is generally not good practice.

Global sub-classing within your application's process is useful, though. There is a good article by Kyle Marsh called Safe Sub-classing in Win32 on the MSDN library CD, which I recommend.

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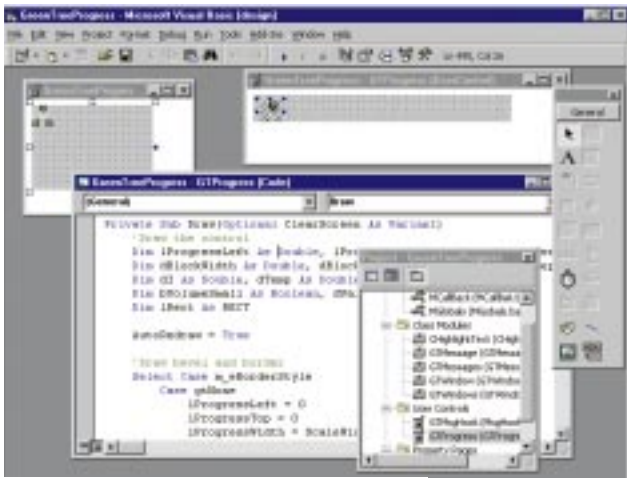


Fig 5 (above) **Active ToolBox controls come with full VB source**

Fig 6 (right) **The VB project from hell: VB Tools 6.0 comes with over 60 controls**

limitations are lack of integration with IDEs like Visual Studio and file-server based networking that restricts usage to small networks.

StarTeam Professional makes good both of these deficiencies. It is a client-server package that can use any ODBC data source and this makes it suitable for wide-area networks. There is a web-browser interface, too, although this lacks the full functionality of the StarTeam workstation client. The advantage is that you can use StarTeam for cross-platform projects: for example, a web project involving a Unix server, a Windows web editor and designers working on Macs.

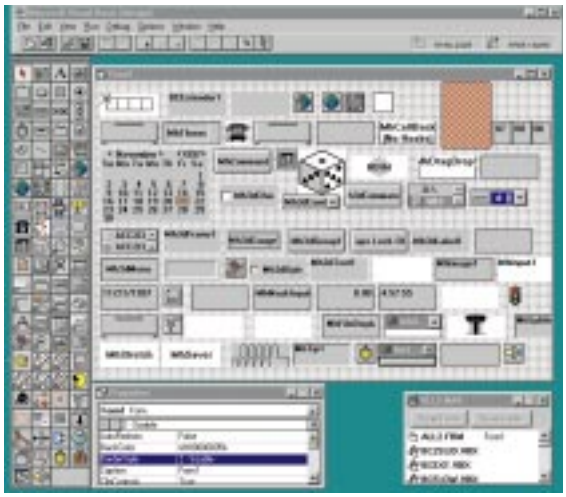
The real interest of StarTeam is that, unlike Visual SourceSafe, it goes well beyond simple version control. It includes a flexible change request database. A change request can be a bug report or a suggestion for a future enhancement. Requests can include a description, workaround or fix, and attachments such as screenshots to illustrate a problem.

Requests can also be linked to particular source files. For instance, if you find a problem with a particular routine you can link it to a change request so that whenever the file containing that code is selected, the problem is listed below. When you fix the problem, the link is maintained to remind you and others about what was done.

StarTeam also has an integrated discussion area with full threading. This has great potential for improving team communication and lets you keep a discussion of technical issues alongside the related source code.

Another strong feature is the fine degree of control over access rights. You can hide files completely from groups of users, so you might have a marketing group with access to documentation but not source code.

Rather than just being a developer tool, StarTeam can involve users, testers, designers, managers, and sales and marketing people. It is therefore a tool which addresses several key issues of software development including communication, source-code management and documentation of change.



Active Toolbox

C++ or Delphi developers are used to the idea of getting source code with third-party components. Visual Basic users aren't usually so lucky. But not any more, since Active Toolbox is written entirely in Visual Basic and comes with complete source code (Fig 5).

This is a huge advantage, since running into an incurable component bug late in the development cycle is every developer's nightmare. It also means you can use Active Toolbox as a tutorial example for how to create full-featured ActiveX controls in VB.

The controls themselves include an Outlook-style sliding grouplist, an Office 97 flat-button toolbar, a splitter control, a control for system tray applications and a progress bar. Although not especially original, it is a useful set of components for creating an interface with an up-to-date look-and-feel. The toolbar neither floats nor docks, so it is not quite true Office 97 style.

In general the controls are not as sophisticated as typical feature-laden components from FarPoint or Sheridan but that is not necessarily a disadvantage, given that you can get in and customise them for yourself if needs be. Only the Professional version has the source, which means you should avoid the Standard version.

VB Tools 6

Still coding with Visual Basic 3.0 or Delphi 1.0? You are not forgotten. BeCubed Software has released a new version of VB Tools, formerly a Microhelp product.

There are seven new controls, including a flowchart control and an international control to assist the use of resource scripts — files which let you store the text for captions and dialogs so that you can easily replace one language with another. Judging by the documentation there will shortly be an OLE Tools 6 as well, with the equivalent controls in OCX versions. It's a good-value bundle, with 60 controls altogether (Fig 6). There are old favourites like the gauge, calendar and enhanced listbox, and plentiful 3D controls.

The package is spoilt by a casual attitude to details like the online help, which is in Windows 95/NT format only and features a painful inability to spell possessive pronouns. Do not look instead for the printed manual — it does not exist.

There are many useful controls here but individually they are seldom the best in their class. Most are little changed from earlier versions.

PCW Contacts

Tim Anderson welcomes your Visual Programming tips and queries. He can be contacted at the usual *PCW* address (p10) or at visual@pcw.vnu.co.uk

Active Toolbox £111.63 (£95 ex VAT) from QBS on 0181 956 8000 www.qbss.com

Contemporary Software 01344 873434 www.contemporary.co.uk can supply: **VB Tools 6** £116.33 (£99 ex VAT); **Visual SourceSafe** is either bundled with various Microsoft development products or is available separately at around £468.83 (£399 ex VAT) (Microsoft 0345 002000); **StarBase Version 2.0** costs £88.13 (£75 ex VAT); **StarTeam 3.0** prices not yet announced.

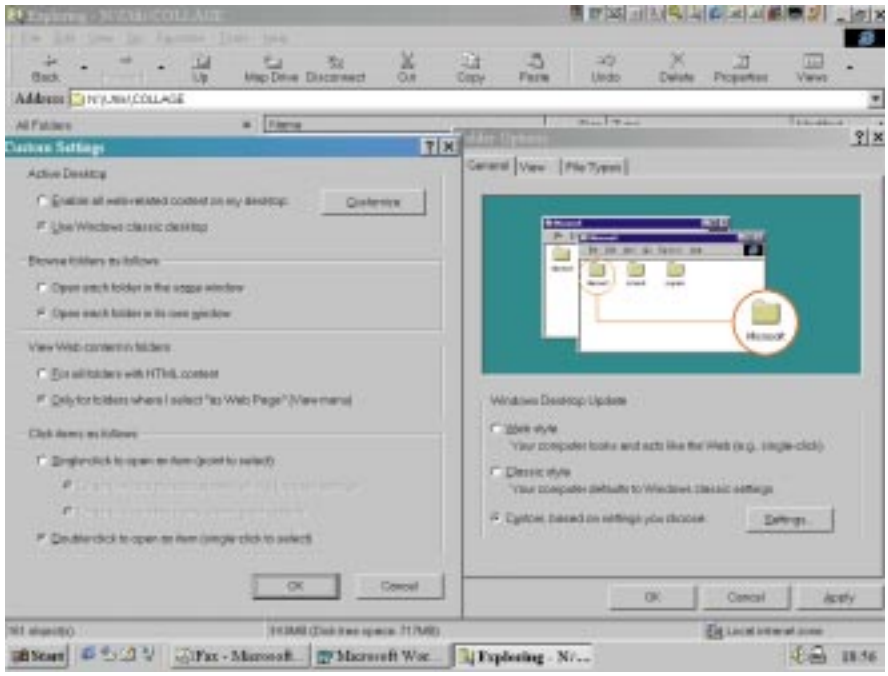
Looking forward

Bob Walder provides a taster of networking in Windows 98: we've got new features like Accelerator Packs, FAT32 and integrated internet to look forward to. Roll on release date!

Let's take a quick look at a few of the new networking and internet features which are going to make it into the release version of Windows 98.

1. The ISDN 1.1 Accelerator Pack doesn't need to be installed in Windows 98. The features which the Accelerator Pack provides are included as part of the OS.
2. The Win32 Driver Model (WDM) is an all-new, unified driver model for Windows 98 and Windows NT 5.0, allowing new devices to have a single driver for both operating systems.
3. FAT32 is an improved version of the FAT file system. FAT32 enables disks over two gigabytes to be formatted as a single drive. It also uses smaller clusters than do FAT drives, which results in more efficient use of space on large disks.
4. With the integrated internet shell included with Windows 98, internet access becomes a seamless part of the user interface. Not too sure this is a good thing, myself!
5. The Dialup Networking included with Windows 98 has been updated to support Dialup Scripting and Multilink Channel Aggregation. This latter feature enables users to combine all available dialup lines to achieve higher transfer speeds.
6. Client Support for Point-to-Point Tunnelling Protocol, providing a way to use public data networks such as the internet to create virtual private networks connecting client PCs with servers.
7. Windows 98 includes all the components necessary to enable your desktop to act as a Remote Access Server. Dialup clients will be able to connect remotely to a Windows 98 machine for access to both local and connected network resources.
8. Windows 98 includes Client Services for NetWare that fully support Novell NetWare Directory Services (NDS).
9. 32-Bit Data Link Control (DLC) protocol is included, enabling a network administrator to add support for 32-bit and 16-bit DLC programs. (DLC is used mainly to access IBM mainframe and AS/400 computers.)

I have been using Beta 3 for some weeks on a live machine and have found it to be stable and usable. Even Internet Explorer 4.1 is behaving itself. Just stay clear of the Active Desktop!



A new range of folder settings within Explorer. Check out the new-style tool bar in Windows 98

Top Tip: Long filenames in Windows 95

As if the advice on staying clear of Active Desktop were not enough, I have another gem for you regarding Windows 95 long filenames.

At first glance they may seem like the perfect tool for organising the directories and files on your PC. But although you can exploit long filenames to describe the contents of your directories, you should be cautious about using them in your root directory. DOS imposes a 512-entry limit in the root and this is still true in Windows 95.

While 512 may sound like an extremely large number of entries, it's not, because when you create a long filename Windows 95 uses one directory for the file's 8.3-style DOS name and another for its long filename alias. Therefore, if all your filenames are longer than the 8.3 format can handle, your limit is reduced to 256 entries.

Book review: a sense of déjà vu

Windows 98 Official Preview Kit (Beta Release)
Author Russell Borland
Publisher Microsoft Press
Price £27.99

A couple of months ago I reviewed a book entitled *Introducing Windows 98 (Beta Release)* written by Russell Borland and published by Microsoft Press for £18.49.

I concluded that "If you don't already have a book entitled *Introduction to Windows 95* then this particular tome is a reasonable grounding in Windows 9x technology and provides a useful early look at all the new features to come in Windows 98, even if it lacks any real nitty-gritty detail. If you do have some Windows 95 books lying around, however, then there is an awful lot of that information which will be duplicated here and you might be better off reading a few in-depth magazine reviews to glean details of the new features in Windows 98. For anyone looking for extensive coverage of networking topics, then you should leave well alone."

I thought I would get hold of this book to compare and, lo and behold, it is identical! "Oh well." I consoled myself. "Being a Preview Kit, at least I can install a beta release of Windows 98 from the CD." No such luck. All that is on the CD is a version of Internet Explorer 4 with a few shell extensions which provide an idea of what the Windows 98 web-based user interface will look like, an online version of the book and a few other less-than-interesting items.

In short, I wasn't that impressed with the original version and, for an extra £10, I would definitely give this one a miss.

• *My thanks to Computer Manuals (0121 706 6000) for supplying me with review copies.*

Windows — Pan-European or not?

In my February column I posed a question regarding the Pan-European version of Windows 95. I expected to get a deluge of answers — maybe even a definitive one from Microsoft itself — but alas, no. Thankfully, Gilles Reichert was kind enough to put finger to keyboard, and it is his solitary reply I reproduce here:

"I would like to add some comments about the Pan-European version of Windows. I used to have one at work for some months — it's an English version of Windows, with the support for extra code pages and character sets such as Cyrillic, Turkish and Greek.

"I think the sentence 'Do not install the SP1 Update English version on the English Pan-European version of Windows 95 or any other non-English version of Windows 95' merely means that to cope with those special characters, some binaries have been slightly modified, and so the 'normal' English SP1 would overwrite some vital files for the Pan-European version.

"I'm using a French version of Windows 95 at home and I have installed many English bugfixes (even ones like the Kernel Update) over it. I have no problem at all with this. Sometimes I end up with a message box whose question is in English and the buttons are in French, but I think that's always the case when you use non-French programs on a French version of Windows.

"I don't know any right way to be sure your version of Windows is Pan-European. One test that should work is to check in WordPad if you can select some fonts in Greek or Turkish and then display them correctly. Just try putting two 'i' characters in a WordPad document, one in lower case and the other in upper case, then change the font to a Turkish one. If you can display Turkish characters correctly, even the capital 'I' will have a dot on it. If you see them as European 'i' (lowercase with the dot, uppercase without), then it's not a Pan-European version. Please take note that I'm not *100 percent* sure that this test is correct but I hope this email will help you and Mr. Mallik understand the difference between English and Pan-European Windows." **p364** ➢

Questions & Answers

Q I have just bought a new PC and rather than throw the old one away, I would like to connect the two together. They both have network cards and run Windows 95. What else do I require to connect them?

A This question crops up from at least one person every month, so rather than just keep directing you all to the *PCW* web site to look at old columns I will quickly recap on what is needed. As far as the software is concerned, of course, you have everything you need with Windows 95.

In terms of additional hardware and cabling, however, the easiest way to connect two PCs together is using Thin Ethernet. Standard Thin Ethernet (also called 10Base-2) coaxial cable is readily available and is easy to use, although cards which support it are beginning to get a little "thin" on the ground (*sorry – couldn't resist the pun!*).

You also need two T-connectors and two "terminators": the T-connectors are plugged into the BNC connector of the network card, and one terminator is connected to each T-piece. Each end of the Thin Ethernet cable can then be connected to the remaining connector on the T-piece and that's it — you're cabled up and ready to go. Please do not try to connect a single piece of coax cable directly to the BNC connector on the network cards as it will not work. You must use the T-connectors.

The other option is to use 10Base-T, where we no longer connect PCs in a chain. Instead, we use a "star" configuration with a hub at the centre. Each port of the hub is connected to a PC or to another hub, and all communications go via the hub. This provides much more flexibility in cabling up our networks and uses lighter and cheaper cable (which resembles telephone wire).

This can get a little expensive for connecting just two PCs, especially in a home environment, since the hub is quite an overhead (although you can now get four-port hubs for under £30). Standard 10Base-T cable is designed to connect a PC to a hub, however, not a PC to a PC — the signalling simply will not work.

There is one other possible option in this particular case. When we need to connect two hubs together which do not have "cascade" ports, or when we need to connect a file server directly to a router, for instance, we have to use something called a "crossover cable". Externally this cable looks identical to standard UTP cable but the pairs of wires inside the outer sheath are arranged slightly differently. Using a crossover cable plugged directly into the UTP ports of your network cards should allow you to achieve the same effect as using a single piece of Thin Ethernet cable. Crossover cables are not quite as readily available as standard ones, so make sure you specify your requirements carefully.

Q I have a direct-sales wine operation and have a small web site hosted by an ISP on which I advertise my products. How can I take the next step and actually begin taking orders and selling via the web without spending an absolute fortune (after all, I don't know if it will take off yet, do I?).

Andrew Morgan

A s it happens, I have just finished looking at a product called Actinic Catalog which is specifically designed to enable small companies to set up shop on the internet. It includes everything you need to set up and service a state-of-the-art web-based sales channel and is designed for ease of use.

The only sticking point for some is that

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Questions & Answers (cont'd)

Perl is required on the target web server (which may take some negotiation if your web server is being hosted by a third party) in order to run the scripts which support the catalogue, shopping cart and ordering processes. Once the thing is configured, the rest really is idiot-proof.

Everything is run from a single, intuitive program and the first job is to create the product catalogue itself. The software allows you to create a two-level catalogue (with subject headings and products beneath) using a simple form where you can enter product descriptions, pricing information and so on. You can even include pictures to illustrate the products if you wish. Although the easiest method of catalogue creation is to use the default web-page layout included "out of the box", those with some HTML knowledge might prefer to customise things to their own tastes by amending the standard HTML "templates" and included icons.

Payment options include credit cards, cash on delivery, cheque on delivery, invoice with order, invoice and payment before delivery, and credit-card details sent separately. The last option is for those paranoid customers who are reluctant to send credit-card details over the web but would still like to order via the catalogue: Catalog prints out an order confirmation for them, on which they can write their card details before posting it to you.

All catalogue amendments and order-processing functions are performed off-line and connection is only required for the time it takes to upload the catalogue or amendments, or download sales orders. This keeps connection costs to a minimum if your web site is hosted by a third party, and updating your catalogue on the web server can be done at the click of a button.

Visitors to your web site (potential customers now, of course) see a number of buttons representing the catalogue sections, and clicking on these presents the product descriptions, images and pricing details. Ordering goods is as simple as clicking the Add To Shopping Cart icon, and orders can be amended or discarded at any time. When the customer is ready to order he simply clicks on the "Order" icon, and this is where the really neat bit of Catalog comes into play.

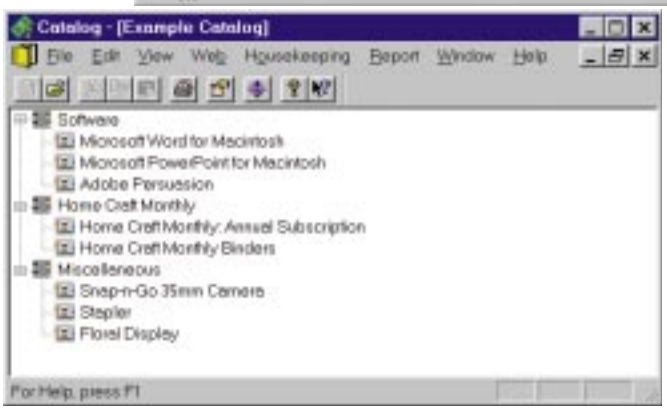
Normal e-commerce solutions use SSL to provide a secure encrypted channel between web browser and commerce server. This level of complexity is not required by Catalog, but in getting around it the security has actually been improved.

To process the order, the browser will download an ActiveX or Java applet (depending on the browser being used) which presents an order form where the user can enter his name and payment details. Because of the high level of encryption, entering credit-card details is very secure, but users can opt to forward their details later or choose other methods of payment such as COD or invoice with order. Only when the orders are safely within the vendor's system are they finally decrypted.

Basic order-processing software is included as part of the package and retrieving encrypted orders from the web site is simply a matter of clicking on the Download icon. Once they have been transferred to the local PC, they are decrypted and made available via the Catalog software.

This is the only way to dip your toe in the waters of e-commerce without having to spend a fortune on infrastructure, development and support, and the product pretty much does everything that is expected of it. If you fancy seeing just what it can accomplish, take a trip around the Actinic web site at www.actinic.co.uk/acatalog/index.html where there is an online catalogue. Also, see our *First Impressions* review, *PCW* April, p94. Actinic Catalog can be purchased from Actinic (01932 860524) for £410.08 (or £349 ex VAT).

Right Actinic Catalog: processing sales orders



Left Actinic Catalog: creating a catalogue

I also had a letter from Colin Marshall, pointing out an omission in my answer (*PCW* March) to a question from Chris Smith regarding Windows 95 file sharing over a Novell 3.12 network.

"To allow the file sharing to take place he needs to set up a user account on Novell in the name of 'WINDOWS_PASSTHRU'. No password is required for this account and single login permission is sufficient. I know this works as I currently manage a Novell 3.12, 25-user network which uses Win95 file sharing to access a CBT course CD-ROM on a PC with file-sharing rights granted."

My thanks goes to Gilles and Chris for taking the trouble to write in.

PCW Contacts

Bob Walder can be contacted via the *PCW* office (p10) or email networks@pcw.vnu.co.uk

Interior design

What can you expect to find lurking benneath the beige shell of your PC, and what role does each part play? Lynley Oram shows you how to get on first-name terms with your PC's insides.

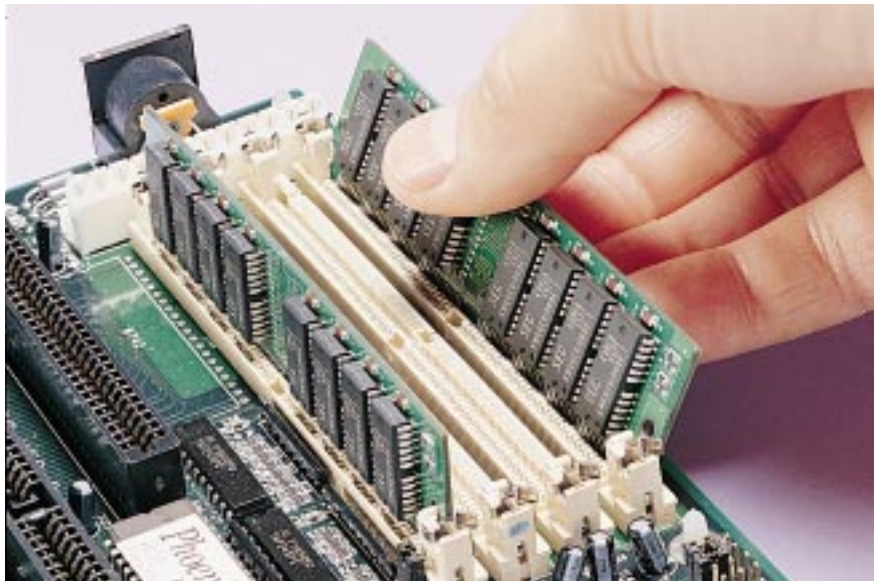
Personal computers have changed considerably in the past 20 years since the launch of the first IBM PC in 1981. However, if you had looked inside a PC in, say, 1991 when 486s were all the rage, you would be amazed at the similarity to today's PC.

This month we're going to indulge in a quick overview of what's inside your machine, and follow the path that data takes as it moves about your system.

Before removing the casing on your system box, check to make sure that doing so doesn't void your computer's warranty. Once inside you'll see a large board, known as the motherboard, onto which are stuck a number of slots and bits of silicon (these are the large, square, dark-grey things soldered onto the board). At the top and to the rear of the case will be a large, encased, square object with a fan at the back: this is the power supply unit (PSU) which takes mains electricity and converts it for use within the computer.

At the front will be a number of bays containing your CD-ROM drive, floppy drive and zip drive. These bays come in two sizes, 5.25in and 3.5in. The hard drive may be in one of these bays, but since it doesn't require external access to use it, the manufacturer may have placed it beneath the floppy drive or tucked it under the PSU.

The multi-coloured wires littered about your PC are power cables. Your drives will be connected to the motherboard with some grey, ribbon-like cables known, unsurprisingly, as "ribbon cables".



RAM is commonly fitted into PCs by soldering several memory chips onto long, thin cards known as memory modules. There are two types of modules: SIMMs (*seen being fitted, above*) and DIMMs which can hold SDRAM, the fastest type of memory

Central Processing Unit

The CPU (central processing unit) lies at the heart of any PC. Just to confuse matters, it is also referred to as a processor and even as a computer chip. It is in fact a chip, but this is a broad generic term for bits of silicon that can do everything from run your PC, to monitoring the fuel injection in a car engine, to telling you when your fridge is too warm.

Unlike the other chips attached to your motherboard, the CPU is not soldered. Instead, it is fitted either into a Socket 7 or, in the case of a Pentium II, into a Slot One. Apart from the processor being the largest bit of silicon you can see, it differs in that it will be covered by a fan or a heatsink and this prevents the processor overheating.

The fan/heatsink required for a Pentium II is exceptionally large and the processor itself slots into the motherboard in a similar way to an add-in card such as a sound card. To stop it falling out or just keeling over, it slots in with the help of a couple of braces. The Slot One is proprietary, in that its patents belong to Intel and therefore only Intel processors may be made to fit it. Socket 7 is not proprietary: any processor that fits a Socket 7 can use it. There is a little lever on the side of the socket, so removing a processor is a matter of unclipping and raising this lever to move it out of its locked-in position.

There is an acronym, ZIF, that often crops up when people are referring to processors and Socket 7, and it stands for zero insertion force. This simply means that no force at all is required to lift the CPU in and out. If it is not fitting properly, then something is wrong: you should check that all the pins on the underside of the processor are still in alignment.

Thanks to Intel's massive marketing drives, most people realise that the processor is an important part of the PC. It is the most vital component because it processes data and controls all the other parts of the computer. Intel is not the only manufacturer of processors. Both AMD and Cyrix produce very good CPUs, with AMD's K6 processors competing well against Intel's Pentium II units.

What the CPU can do

The CPU can only do simple things, such as move numbers from one place to another or perform basic mathematical operations, but it does these very quickly. It works by continually retrieving instructions from the memory that tell it where to get data, what operations to perform on it and where to store the results.

The CPU will process data as instructed by the programs you're running. If my computer is able to produce reports, it has a program which instructs the CPU to execute a particular group of instructions which create those reports.

Often the CPU performs several operations on the same data, or it may need to hold the result from one operation, to be used on the next. Such data needs to

be stored close at hand, so it is put into places called address registers and data registers on the CPU itself. This prevents the processor from having to access the memory each time it generates data.

In 1991 you'd have been really with-it if your PC had a 486 33MHz processor, but today's entry-level machines will have at least a Pentium-class MMX 200MHz CPU.

RAM (Random Access Memory)

A concept which is confusing for beginners is the location of data. The CPU spends its time fetching instructions and executing them. But from where? Is the data in the hard disk, the main memory, or the cache memory? The answer is, all of these. Data is continually moved around. Its location depends on the stage of the CPU cycle.

The data on your hard disk must be copied into main memory before it can be used effectively. This memory is also known as RAM (random access memory) and operates much faster than your hard disk. It is used for handling data currently in use, such as your open documents and applications. Data which the system is not currently processing will be swapped onto the hard disk to save precious RAM resources, using what is known as virtual memory.

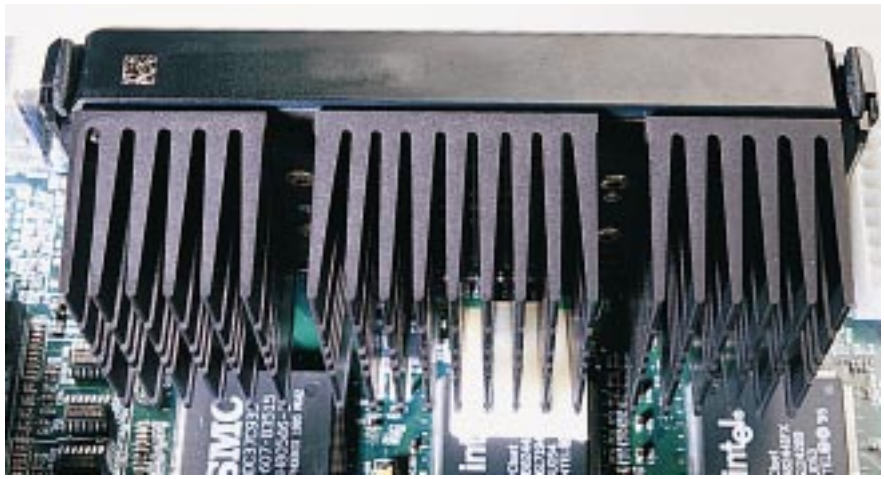
Nothing is kept permanently in the main memory: RAM is wiped clean each time your PC is switched off, or crashes. That's why you must regularly save your documents while working on them. This copies them from RAM back onto your hard disk for permanent and safe storage.

RAM is commonly fitted into PCs by soldering several memory chips onto long, thin cards known as memory modules. There are two types of module: SIMMs (single in-line memory module) and DIMMs (dual in-line memory module). The most common types of RAM are EDO (extended data output) and DRAM (dynamic RAM), both of which can be found on SIMMs and DIMMs. An increasingly common type of memory is SDRAM (synchronous DRAM) which can only be found on DIMMs and is the most desirable memory to have. It works by synchronising signal input/output so the memory chips work at the same speed as the CPU, thus increasing the speed of your computer.

On your PC's motherboard there will be several slots with little clips at the ends. Some or all of these will be fitted with RAM. Slots which take SIMMs are smaller in length than DIMM slots and are usually a lighter colour. In 1991 you could have bought a PC with 4Mb RAM. Today's entry-level machines will have 32Mb of RAM, with many boasting SDRAM, although some budget machines still come with 16Mb. If you can afford it, opt for 64Mb RAM as this will help to prolong the life of your PC — today's programs are becoming increasingly memory-hungry.

Cache memory

Sitting between the CPU and the RAM is something called cache memory. Cache is designed to supply the processor with the most frequently requested instructions and data and is usually much faster than normal main RAM memory. Cache comes in two flavours: Level 1 (between 16Kb and 64Kb fitted within the CPU itself) and Level 2 (typically 256Kb to 512Kb) usually fitted near the CPU, on the motherboard. The exception is Intel's Pentium II, which has its Level 2 cache fitted on the main CPU cartridge, hence its bulk.



The Pentium II processor is big and fast. Note the size of the heatsink and the way the cartridge, encasing the processor, sits upright

Hard disk

The hard disk is that part of your PC which holds all the programs, documents and data when your PC is switched off. The longer you have your PC, the more documents you create, the more data you store and the more valuable your hard disk.

Programs such as your word processor are replaceable. Even if it came installed on your PC, the set of floppy disks or CDs should be included. If anything goes wrong, you can re-install your programs from the floppies or CD back on to your hard disk. However, anything else, such as your precious documents, should be frequently backed up onto spare floppy disks or a storage device of some kind, such as a Zip Drive or Super Disk.

As its name implies, the hard drive is made of aluminium alloy covered with a magnetic coating, making it pretty rigid. As hard disks spin very quickly and have high recording densities, they must be kept free from dust and any other kind of environmental contamination. Consequently, they are completely sealed.

Hard-disk capacity is an area where PCs have changed over the years. In 1991 an entry-level PC sported a 40Mb hard disk: compare that to today, when an entry-level PC ships with a 2Gb (2,000Mb) hard drive.

Data is recorded onto the magnetic surface of the hard disk in exactly the same way as it is on floppies or digital tapes. If you've ever defragmented your hard drive, you probably have some mental image of how the surface of the disk looks. It is treated as an array of dot positions, each of which can be identified and set to a binary 1 or 0. The position of each array element is not identifiable in an "absolute" sense, so a scheme of guidance marks helps the recorder find positions on the disk. The need for these guidance markings explains why disks must be formatted before use. This formatting used to be carried out by the user when a new drive was fitted, but these days drives come pre-formatted.

PCW Contact

Is there a computing subject you'd like to see covered in *Beginners*? **Lynley Oram** welcomes feedback and suggestions from readers. Email her at beginners@pcw.co.uk

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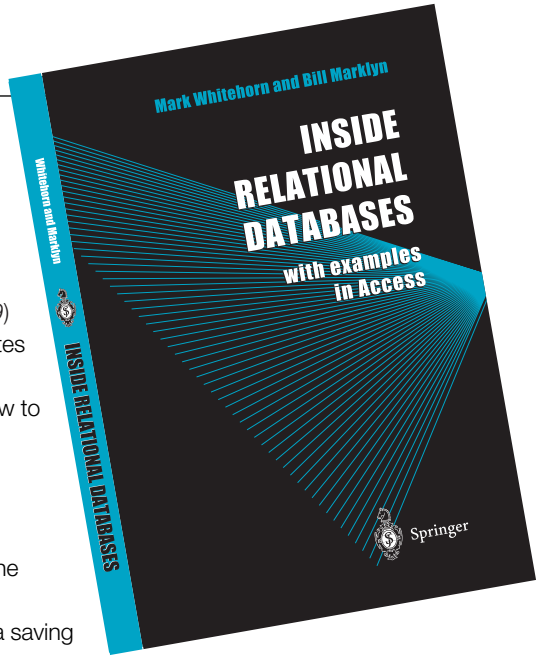

Inside Relational Databases

(*reviewed in PCW November 97, p329*)

- Written by Mark Whitehorn, who writes *PCW*'s Hands On Databases column.
- Explains everything you need to know to create efficient relational databases.
- Avoids the usual database jargon.
- Includes masses of examples using Microsoft Access.
- Source code for all examples is on the accompanying CD.
- Reader offer price is just £14.50 — a saving of £5 on the RRP of £19.50.

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Subscriber price £13.05
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- Collected interviews from *Personal Computer World*, including Bill Gates, Michael Dell of Dell Computers and Intel's Andy Grove.
- Reader offer price £9.95 — over 30% off the RRP of £14.95.

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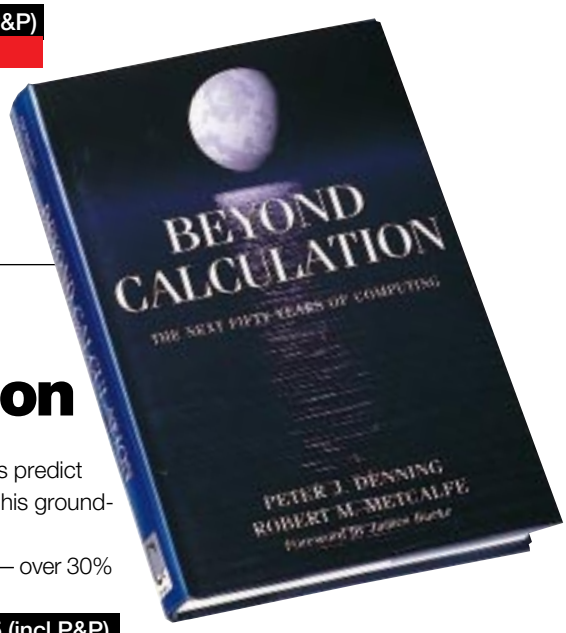

Beyond Calculation

- World-recognised experts predict the future of computing in this ground-breaking book.
- Reader offer price £9.95 — over 30% off the RRP of £14.95.

Reader offer price £9.95 (incl P&P)
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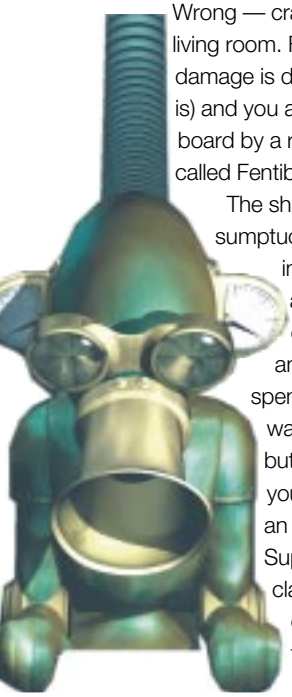
Starship Titanic

Personal Computer World Recommended

The most advanced space vehicle ever built — The Ship That Cannot Possibly Go Wrong — crash-lands in your living room. Fortunately, little damage is done (to the ship, that is) and you are escorted on board by a rather confused robot called Fentible.



The ship is fabulous, with sumptuous art-deco interiors, vast galleries and even a canal complete with gondola and gondolier. You can spend a lot of time just wandering about gawping, but to reach all the parts you'll first need to wangle an upgrade or two from Super Galactic Traveller (3rd class) status. Then it gets complicated. The fact that the bowl of nuts is really the central robot's missing ear can really only be explained by the fact that this is a Douglas Adams production.

It's big, it's beautiful, and it's just crashed into your house

Adams and his team have taken the best points of the point-and-click adventure game and reintroduced the lost art of conversation by providing free-text entry for the player to talk to the characters. A clever parsing engine ensures that the replies, which are both spoken and written, are in some way relevant… or not, as the case may be.

Although you are the only human on the ship there are a number of variously-deranged robots with which to converse, as well as a parrot and the ubiquitous Succ-u-bus (voiced by Adams himself) which transports objects to any chosen destination on the ship… or not, as the case may be.

Tim Nott

PCW Details

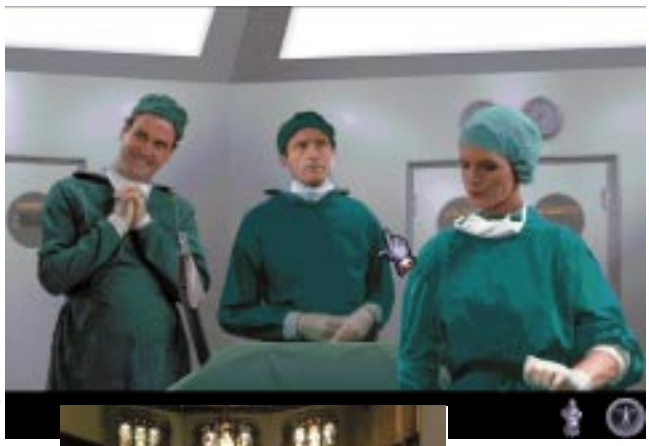
Price £44.99
Contact Zablac 01626 332233
www.starshiptitanic.com
System Requirements PC: P100, 16Mb RAM, 10-50Mb disk space, 16-bit colour. Mac: System 7.5, PowerPC 100, 16Mb RAM, 10-50Mb disk.
★★★★★

The Meaning of Life

The Meaning Of Life is the third release in the Python series. It contains strategy, adventure and, above all, a bit of comedy.

The wizards at Python research labs have invented a new feature for this game. Called Surround-O-Vision, it enables you to navigate 360 degrees around the Monty Python environment.

The first part of the game relates mainly to the Python film, integrating clips with gameplay. Those who have seen the film will be able to relive the scenes as they instinctively click on the appropriate characters at the appointed times. Other parts of the game also include clips from the original Monty Python's Flying Circus television series, such as the "How to defend yourself against a man armed with a banana" sketch.



Above **The Meaning of life starts off by giving birth**

Left **A clip from the film**

The crazy pursuits involved in completing puzzles should keep fans entertained, although after hours of playing the jokes do start to wear thin and become silly rather than funny.

I enjoyed some of the sections like clicking on parts of the screen and listening to the responses. I also liked the puzzles within the game such as You Don't Know John, and I had fun with Live Organ Transplants where the player has to try and perform interactive surgery.

The Python team however, although funny, seem outdated. So don't buy this game unless you're a real fan.

Michael Murphy

PCW Details

Price £39.99
Contact Take Two 01753 854444
www.pythonline.com
System Requirements IBM PC or compatible, Pentium 100 or greater, Windows 95 or Windows NT 4.0, 16Mb RAM.
★★★☆☆

Nightmare Creatures

It is 1660, and a secret society known as the Brotherhood of Hecate is causing fear and panic on the streets of London. Founded by Adam Crowley, the BOH is busy conjuring up deformed evil creatures that roam the fog-shrouded streets, tearing the arms and legs off anyone they meet. You play one of two heroes in a hugely enjoyable quest to defeat these malign forces. Titling himself as "a Man of God", Ignatius is actually a staff-wielding nutter with a penchant for dismembering monsters. Similarly, Nadia is an athletic psychopath with a big, sharp sword — just be glad they're on your side. Both characters have a wide repertoire of fighting moves and, although you can play the game using a keyboard, you'll find Nightmare Creatures far more fun with a joypad.

Monster madness sweeps London

The game uses a cinematic, roving-camera third-person perspective similar to Tomb Raider. The 3D graphics are excellent: solid monsters, transparent fog and impressive rain effects. Nightmare Creatures supports a variety of 3D accelerator cards. The audio is realistic, with a particularly fine squelch as a zombie's dismembered head falls to the floor. The monsters are clever and vicious, and the difficulty is pitched at the right level to keep you enthralled for hours on end.

In the UK, Nightmare Creatures is currently available for the Playstation. The PC version will arrive later this year.

Adam Evans

PCW Details

Price In the US, $49.95

Contact Activision 001 310 255 2000
www.activision.com

System Requirements Win95, P133, 16Mb RAM, 2X CD-ROM drive, 20Mb HD space, 16-bit colour SVGA video card with 1Mb RAM (hardware acceleration recommended), uses MS DirectX.

★★★★☆

TOCA Touring Car

Looking for some serious pedal-to-the-metal action? Then stick-shift your way to one of the newest racing games in town. TOCA Touring Car Championship, from Codemasters, is the perfect racing game, with a domestic twist that keeps you revving for more. TOCA is based on the British Touring Car Circuit, with tracks similar to Brands Hatch or Silverstone.

There are eight cars from which to choose, each with its own unique handling characteristics. You can select your favourite car, whether it is the Vauxhall Vectra, the Renault Laguna or the Nissan Primera. There are four modes of racing: Single Race, Championship, Time Trial and Network Play. You have seven race tracks to play but you'll have to start winning a few before you progress from the first to the last.

The gameplay is smooth and fairly realistic. If you crash your car it will slow you down, and if you drive dangerously or the wrong way around the track you can expect a penalty.

Watch out! You need to stay on the track or you lose precious points

TOCA Touring Car is one of the most accurate racing games around. It has patches for 3DFX, PowerVR and OpenGL-based graphics cards and makes good use of Microsoft's latest 3D API, DirectX 5.0 and, more specifically, Direct3D (D3D). With this last you get a true 3D feel: textures on oddly shaped objects and transparent smoke effects — gone are the days of square, black blockiness when you screech away.

Dylan Armbrust

PCW Details

Price £34.99

Contact Codemasters 01926 814132
www.codemasters.com

System Requirements Windows 95, 16Mb RAM, 4-speed CD-ROM, 14Mb hard-disk space, with 3D graphics card, P133 CPU and without 3D graphics card, P166 CPU.

★★★★☆

p374 ➢

The Reap

"Adrenalin in its purest form" claims the packaging, so there was no way I could say no to reviewing The Reap, from Take 2. It is a shoot-em-up with a plot that treads the well-worn path of aliens taking over the earth. You are cast as a mercenary pilot whose job it is to fly ten killing missions. Random fire usually does the job, as your brief is to clear earth of humans, buildings and vehicles in preparation for alien occupation.

Take 2 uses the isometric 3D perspective, most famously seen in Zaxxon in the eighties. It's a good job you've been told that you're a pilot because the perspective sheds no light on whether you're driving on the ground, hovering just above the surface or flying high in the sky.

The motion of the game is quick and smooth and the graphics, dull and dark at first, improve as you go. The main problem is that you cannot identify with the craft you are supposedly controlling: the reality of being in the craft and firing bullets is lacking.

Although this game boasts DirectX technology and a level of artificial intelligence rare to shoot-em-ups, I got bored long before the benefits showed. Sadly, there was no adrenalin involved.

Rachel Spooner

Top Fire at everything you see from your little aircraft
Above Is this the Blue Plasma or the Electric Spline? It's time to weapon-up!

PCW Details

Price £34.99

Contact Take 2; 01753 854444 www.take2europe.com

System Requirements Win95, P75 (min), 16Mb RAM, quad CD, sound card, 1Mb video card (recommended 2Mb video card and DirectX 5)

★★★☆☆

Myth

Myth, the Fallen Lords, is a fantasy real-time strategy game with a few impressive tricks up its sleeve. The background setting to this game reminds me, in part, of JRR Tolkien's *Lord of the Rings*.

The continent is in ruins, the one remaining city is under siege…

The Fallen Lords have risen from the dead and their evil forces have ravaged most of the continent. One city remains, stemming this evil tide and preventing the world from falling into utter ruin. But at the point you enter the game, the city is under siege.

Before each scenario begins, an old "experienced soldier" explains what has happened and what you are meant to do during your mission. This is related to you in the style of a tale and adds a bit of character to the game, which is a nice touch.

The impressive part of this game is that the missions you undertake are completely 3D. Rotating the screen means that you can view your men from different angles. To become good at the game you must truly master your orientation skills because it gets confusing at times, particularly when you are controlling different groups of soldiers. It seems that no detail is too small, even down to the dismembered body parts caking the terrain in blood. This is a very realistic strategy game and should provide many hours of frustrating enjoyment.

Michael Murphy

PCW Details

Price £44.99

Contact EIDOS 0121 356 0831 www.eidos.com

System Requirements Pentium 90MHz, 16Mb RAM, Win95/NT4, 32Mb free hard-disk space, DirectX-compatible video card.

★★★★☆

Brainteasers

Quickie

What single item can be found at the back of every bus and at the front of some sports cars?

This month's prize puzzle

This month's problem isn't too difficult and can be solved by analytical means if you know how. But for those who don't, it should yield easily to a not-too-complicated computer program.

In previous puzzles we have mentioned the island of Tonterias. The population there is growing steadily in numbers and at today's birth and death rates it should have doubled in 100 years.

The current annual birth rate is 1 birth per N of the population, the death rate is 1 death per (N+24).

What is N?

Send your answers on a postcard or on the back of an empty sealed envelope to:
PCW Prize Puzzle - May 1998
P.O. Box 99
Harrogate
N. Yorks HG2 0XJ
to arrive not later than 20th May 1998.
Please do not send solutions on floppy disks or in envelopes.

Winner of February 98 prize puzzle

A good response to a fairly easy problem. Well over 200 entries were received, most of them with the correct solution — Boss 41, Secretary 31.

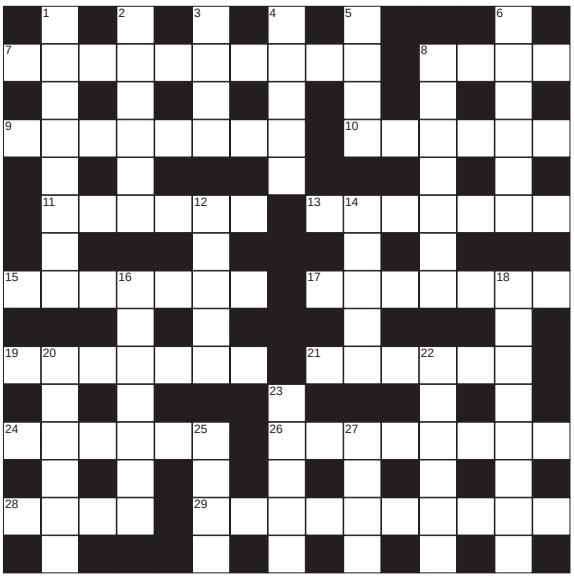
It was rather unfortunate for someone that the first card we drew out from the correct entries had neither name nor address on it, so this mystery entrant missed out on a prize.

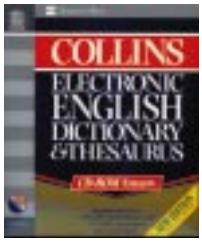
However, the next selected card had no such problems: it was from Mr Manthos Kallios of Brentwood in Essex. Congratulations, Mr Kallios, your prize is on its way.

Meanwhile, to all the others — keep trying, it could be your turn next. And do make sure that you have enclosed your name and address with your entry.

JJ Clessa

Prize Crossword No. 7





Haven't got a clue? Maybe you could do with the help of the Collins Electronic Dictionary & Thesaurus. Each month, we're offering one lucky *PCW* reader the chance to win a copy. Send your completed crossword to PCW March Prize Crossword, VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive by 24th May 1998.

• *Please state clearly on your entry if you do not wish to receive promotional material from other companies.*

ACROSS

7 3.5 inch slot receives it (6, 4)
8 Begin with footwear! (4)
9 Get all the data from another source (8)
10 Programmer's language from a while ago (6)
11 The person who produced the software (6)
13 Pay close attention to the screen? (7)
15 Separate part of a disk (7)
17 Useful jump from one site to another (3, 4)
19 Partial internal stores for data (7)
21 Itemised list of activities performed (6)
24 Software box requiring an answer, in American-English (6)
26 The second T of HTTP (8)
28 Just a term for part of Gates's office package? (4)
29 Dreaded failure messages (5, 5)

DOWN

1 Allot (8)
2 Old keyboard instrument (6)
3 Printing mistake (4)
4 Very breezy (5)
5 Jump over (4)
6 Spud (6)
8 Like a wild animal (7)
12 Proprietor (5)
14 Threatened atmospheric layer (5)
16 Silenced (7)
18 Chatted (8)
20 Agreement (6)
22 Exhibited (2, 4)
23 Tempest (5)
25 Delight (4)
27 Broadcasts (4)

April solutions

ACROSS
7 ASCII 8 Gifs 9 Read 11 Archie 12 Firewall 13 Go to 15 URL 16 Demos19 Uniform 20 Pirated 23 Trees 25 EXE 26 Spam 28 Protocol 30 Mosaic 32 HTML 33 Unix 34 Beeps

DOWN
1 User 2 Fight off 3 Pitfall 4 Astra 5 Browse 6 Pail 10 Require 14 Owner 17 Omega 18 Dilemma 21 Assisted 22 Declaim 24 Extols 27 Scrum 29 Rate 31 I-spy

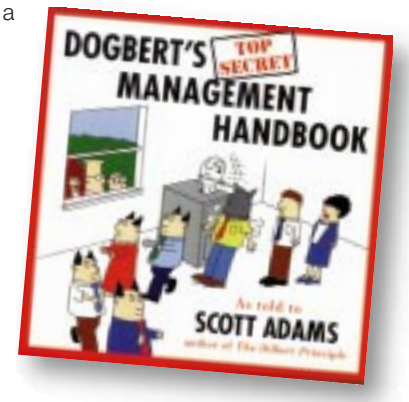
Books

What PC?'s no-nonsense beginner's guide to mastering your PC and its software. And Adams does the double on Dilbert/Dogbert.

Seven Years of Highly Defective People: A Guide to the Evolution of Dilbert

The whole Dilbert universe is here, with accompanying commentary on the characters, their evolution, those who came and were liked, and others who received the thumbs down.

Why does Dilbert's boss have a devil's haircut? Whatever happened to Dilbert's girlfriend? All the answers are here but this book is not as exhaustive as it sounds. Dilbert creator, Scott Adams, claims in the introduction to have written all the commentary "off the top of my head" in three sittings, stopping "only long enough to rest my weary hand". Essentially the book is a cash-in. But who cares? I found it so funny, I had trouble breathing.



Dogbert's Top Secret Management Handbook

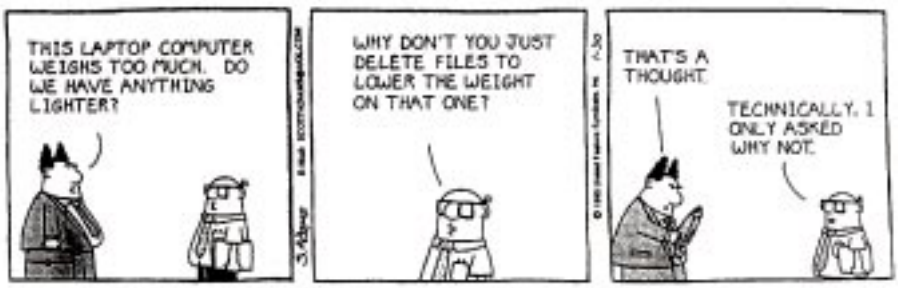
This book should satisfy Adams aficionados, as the author has obviously taken longer than three sittings to pen his thoughts (*see the review above*).

If the horn-haired boss is your favourite character, then this is the book for you. This excellent handbook compresses all Adams' cynicism and frustration with corporate life: frightening to witness because the workplace he describes could be yours.

Illustrating his points with cartoons, Adams gives his theories on how to manage in a world where sniffer dogs are "specially trained to detect wasted resources". And there is a priceless Seventh Rule of Management: "If ten people can complete a project in ten days, then one person can complete the project in one day". The contents page for each chapter seems innocuous enough, with sections entitled Employee Satisfaction and Motivation Task Force. But lurking inside are Adams' warped views on nineties corporate life.

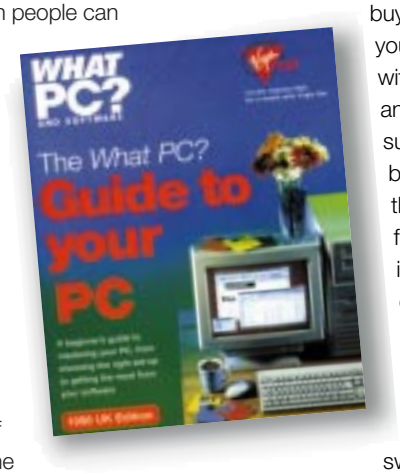
Approach with caution if you're experiencing even the remotest twinges of dissatisfaction at work.

Paul Trueman



What PC? Guide to Your PC

A cover-mounted New Riders WWW directory CD (previously priced at £9.99) and the What CD? disc attached to the inside back cover make the *Guide* exceptional value for money. The latter CD features a variety of software including Paint Shop Pro, Ulead Animator and Family Tree Generator, a variety of reference materials and an online Jargon Buster. We were not surprised that some of the links in the WWW directory disc were outdated, for such is the nature of the internet, but we were disappointed by its American bias. This was particularly evident in the politics and television sections.



The 34 chapters of this weighty tome are divided into four easy-to-follow sections: buying and upgrading your PC, getting to grips with Windows, choosing and using software, and surfing the net. It has been written in a style that even beginners will find easy to follow and its jargon-buster boxes explain the technical terms. The text is peppered with amusing tips. For instance: "Never swing the mouse around by its tail, tempting though it is. And if it stops working, don't flush it down the toilet!" The book offers useful buying advice and one particularly important point stands out: "It's hard to be sure that this is all you will want to use the PC for in a year's time… Think ahead".

Don't be tempted to follow the example on the cover, though, and stand a water-filled vase of flowers on top of a live computer monitor!

Nik Rawlinson

PCW Details

The What PC? Guide to Your PC
Author Rob Young
Publisher Prentice Hall
ISBN 0-13-095132-3
Price £16.99
★★★★☆

Seven Years of Highly Defective People: A Guide to the Evolution of Dilbert
Author Scott Adams
Publisher Boxtree
ISBN 0-7522-2407-07
Price £8.99
★★★★☆

Dogbert's Top Secret Management Handbook
Author Scott Adams
Publisher Boxtree
ISBN 0-7522-1148-X
Price £6.99
★★★★☆

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No-nonsense Buyer's Guide

The *PCW* Buyer's Guide is packed with sensible advice about what to buy and how to buy it safely. Buying direct through our pages can save you hundreds of pounds, but do stick to our 12-point guide to buying direct.

Twelve rules for buying safely

1. Always use a *PCW* order form.
2. Keep the original advertisement.
3. Keep copies of all correspondence. If you speak on the phone make a note of to whom you spoke.
4. On large orders, obtain a written quotation.
5. If possible, pay with a personal credit card. All transactions over £100 should be covered by the card company's insurance scheme.
6. Does the price quoted include everything discussed? Is VAT extra?
7. Check how the supplier will deliver and whether or not delivery times are guaranteed.
8. Is free telephone technical support included in the price? Some suppliers offer support only on premium 0891 numbers. Is it easy to get through? Try dialling the number to test it out.
9. Is the warranty return-to-base or onsite? "Return-to-base" means that you'll have to pay to ship the product back to the supplier.
10. If you're paying extra for online support, does the manufacturer offer guaranteed response times? If you rely on your PC for your business you'll need it fixed, pronto.
11. Is the supplier reputable? Does it comply with BS5750 or ISO900? If in doubt, ask to see customer testimonials.
12. When your PC arrives, check that all branded components are genuine.

Buying a PC

PCs get cheaper and faster all the time and your state-of-the-art PC can quickly become outdated. That may not matter, though, if it still does what you require. But if you're buying a new general-purpose PC now, it should be fitted with a CD-ROM drive, sound card and speakers so that you'll be able to play games and run a wide range of modern software.

Minimum specifications

- It is a false economy to buy a new PC with less than 16Mb of RAM. The jump from 8Mb to 16Mb of RAM makes a huge difference to performance.
- Ensure Pentium motherboards have an Intel Triton 430 VX, HX, TX, LX or compatible chipset.
- Avoid 14in monitors. The difference between 14in and 15in doesn't sound much but means the screen is 15 percent smaller. If you can afford it, buy a 17in monitor.

Other things to consider

Most small PC manufacturers buy their motherboards from Taiwanese or far eastern manufacturers. Larger companies either design their own motherboards (e.g. Apricot, Compaq, IBM) or get motherboards built to their specification (e.g. Gateway). Intel chips are no longer the only choice. AMD's K6 processors are well worth considering, too. It is amazing how hard disks fill up and it's unusual to have *too much* disk space.

Some suppliers offer you the choice of Windows 95 or Windows NT. For general home or small office use, Windows 95 is still the best choice. You may need to consider NT for some specialist applications like programming, DTP or CAD.

Practically every month, CD-ROM drives get faster. Higher speeds and bigger numbers just mean you can access files from them more quickly and that video clips on them play more smoothly.

Look closely at the software that's bundled with your PC. If you want an Office suite it's usually cheaper to buy it bundled with your PC. Software bundles can also be an excuse for manufacturers to unload piles of old or second-rate software. Check whether you get the original media if you need to re-install.

For this Buyer's Guide we've drawn up four specifications. We haven't mentioned particular manufacturers because you'll find up-to-date PC reviews in every issue of *PCW*.

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Buying a **Notebook**

Notebooks belong in the one area in which it is often safer to stick to brand names. It is not so much that some of the Far Eastern kit doesn't work perfectly well, but reliability seems to be a problem and it can be fiendishly difficult to obtain spares. A useful guideline when choosing a notebook is to try before you buy.

Remember that standard notebook specifications are generally a step or two behind their desktop equivalents.

What to look for in a notebook

- **Pointing device** There has been a move away from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled by the use of one finger).
- **CD-ROM drives** These are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.
- **Floppy disk drive** Often, there is a choice between a CD-ROM drive and a floppy disk drive. If the notebook is to be your only machine, make sure that the CD-ROM drive and the floppy drive can be used simultaneously.
- **PC Cards** Modern notebooks all have at least one PC Card slot. They take credit card-sized expansion cards which add a fax-modem, a network interface card or even an extra hard disk to your computer.
- **Battery life** Battery life varies, from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now replaced the older NiCad (Nickel Cadmium) batteries.
- **TFT screens** TFT screens are of a higher quality than dual-scan or passive-matrix screens, using a sharper picture and no shadowing or ghosting.
- **Warranty** Drop a notebook and it may break, so it is vital to check the terms of your warranty. How long is it? What level of service is provided? Remember — better safe than sorry.

PCW Second-hand spec

Buying second-hand or discontinued kit is the cheapest way to get started. This is the minimum spec we think you should choose for general business use, playing games and accessing the internet.

- Windows 3.1 or 3.11
- 90MHz Pentium processor
- 16Mb RAM
- Graphics card with 1Mb of memory
- 1Gb hard disk
- 3.5in floppy disk
- CD-ROM drive
- 14in colour monitor

PCW Minimum specification

This is the absolute minimum spec we think you should consider if you are buying a new PC. Suitable for general business use: word processing, databases, spreadsheets and, with a modem, accessing the internet.

- Windows 95
- Pentium 166MHz MMX processor
- 32Mb RAM
- Graphics card with 2Gb of memory
- 1.2Gb hard disk
- 12-speed CD-ROM drive
- 15in colour monitor

PCW Recommended spec

If you are not short of cash, this is the specification we recommend. No-one at *PCW* would settle for less.

- Windows 95 or Windows NT 4.0
- Pentium or equivalent 233MHz PII processor
- 32Mb EDO RAM
- 3D graphics card with 4Mb of memory
- 4Gb hard disk (modern computer software takes up a lot of space)
- 16-speed CD-ROM drive
- 17in colour monitor
- 16-bit SoundBlaster-compatible sound card

PCW Best specification

This is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need even more memory, a bigger hard disk, a more powerful graphics card or a larger monitor.

- Windows 95 or Windows NT 4.0
- 333MHz PII
- 64Mb SDRAM
- 8Gb hard disk
- 20-speed CD-ROM drive
- 19in colour monitor
- 4Mb VRAM or WRAM graphics card (this means your graphics card can display more colours, and at a higher resolution on your monitor: 16 million colours at a resolution of up to 1,280 x 1,024
- 16-bit wavetable sound card

PCW Minimum specification

Notebooks change quickly. It is possible to pick up end-of-line machines with Pentium processors from brand-name manufacturers like Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use.

PCW Recommended spec

- Windows 95
- Pentium 166MHz
- 16Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 2.5Gb hard disk, 3.5in floppy disk drive and/or 6X CD-ROM drive
- TFT 800 x 600 screen

PCW Best specification

The state-of-the-art notebook: either you're loaded, or your company's picking up the tab.

- Windows 95 or Windows NT
- Pentium 266MMX
- 512Kb secondary cache
- 64Mb RAM
- On-board graphics with 2Mb of VRAM memory, PCI local bus
- 5Gb hard disk
- 3.5in floppy disk drive
- 20-speed CD-ROM drive
- Active matrix 1,024 x 768 TFT screen
- Long battery life

Glossary of computing terms

A

Access time
The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Applications
An application, or package, is one or more programs used for a particular task. For example, word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for specific uses.

ASCII (American Standard Code for Information Interchange)
Usually a synonym for plain text without any formatting (like italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary in order for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible
Compatibility of hardware or software to older versions of the product or standard.

Baud rate
The number of electronic signals that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V and Bit).

BIOS
Basic Input/Output System. Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit
Binary digit, the basic binary unit for storing data. It can either be O or 1. A Kilobit (Kbit) is 2^{10} (1,024 bits); and a Megabit is 2^{20}, which is just over a million bits. These units are often used for data transmission. For data storage, megabytes are more generally used. A megabyte (Mb) is 1,024 kilobytes (Kb) and a Kb is 1,024 bytes. A gigabyte (Gb) is 1,024Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot
Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press CtrlAltDel) or a cold reboot, where you switch the computer off and back on again.

Bus
A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST
Cache On A Stick.

CD-ROM
A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data: equivalent to about 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, yet this makes them ideal for archiving.

CISC (See **RISC**)

CPU
Central Processing Unit. Normally refers to the main processor or chip inside a PC. (See Processor.)

Crash
Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software) or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)
Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)
Common measure of the resolution on a printer, a scanner or a display.

Drive controller card
An expansion card that interprets commands between the processor and the disk drives.

Drivers
Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)
A bus standard designed to compete with MCA. Now being replaced by PCI.

Electronic mail (E-mail, email)
Still the biggest single use of the internet. When you sign up with an ISP you are given an email address. Usually you can incorporate your name, or part of it, into your email address to make it easy to remember.

Expansion card
Circuit boards which fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external version (which is more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive
Practically all PCs come with a floppy disk drive: 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy, 5.25in disks.

Fonts
A font is an alphabet designed in a particular style. Fonts apply both to screen and printed letters. TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format
To wipe a floppy or hard disk in order to prepare it to accept data.

G

GPF
General protection fault.

Graphics card
An expansion card which interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)
(See Windows)

H

Hard disk
Sometimes called a fixed disk, hard disks are hermetically sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb but disks of up to 9Gb are available.

Hardware
All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)
The standard language used in the creation of web pages, which can be read by web browsers.

I

IBM-compatible
Originally meant any PC compatible with DOS.

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Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

IDE (Integrated Drive Electronics)
A control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features.

Internet
Millions of computers interconnected in a global network.

ISP (Internet Service Provider)
ISPs provide access to the internet. You use your modem to dial the ISP's modem. The ISP has a high-bandwidth permanent connection to the internet.

IRDA (Infra-Red Data Association)
The standard for exchanging data using infra-red, typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)
This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it remains in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI.)

ISDN (Integrated Services Digital Network)
Offers significant advantages over analogue telephone lines. It can handle multiple transfers on a single connection and is faster. In the UK, however, costs of installation and rental remain high.

J

JPEG (See MPEG)

K

Kbit (kilobit), Kb (kilobyte)
(See Bit)

L

LAN (Local Area Network)
(See Network)

Local Bus
PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it replaces.

M

Macintosh (Mac)
A personal computer made by Apple and which is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows but pre-dates it and (in some people's view) looks and works much better.

Maths co-processor
A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)

Mb (megabyte) (See Bit)

MCA
A type of bus designed by IBM to beat EISA. Although faster, it never became popular: this was because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)
A standard for compressing video, available in several flavours: MPEG 1, MPEG 2, MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory
The term normally refers to RAM (Random Access Memory). This is the kind which disappears when you turn off your computer and is much faster to access than a hard disk. It acts as a staging post between your computer's hard disk and its main processor.

- **Cache memory** Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of in-built cache. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is often used to cache your hard disk.
- **DRAM (Dynamic Random Access Memory)** This requires its contents to be replaced every one thousandth of a second and is the most common form of memory found in PCs.
- **EDO (Extended Data Out RAM)** Memory that is cached to improve performance.
- **FPM RAM (Fast page mode)** Like EDO Ram but without the onboard cache
- **ROM (Read-Only Memory)** A type of memory which can only be read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, like the information the computer requires when you start it up.
- **SDRAM (Synchronous DRAM)** The latest type of fast memory. This runs at the same speed as the processor and allows the input and output of data at the same time.
- **SRAM (StaticRAM)** Retains memory until the power is switched off.
- **VRAM (VideoRAM)** Faster than DRAM, this is used by graphics cards.

MMX (Multimedia extensions)
(See Pentium)

Modem
The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers.

Monitor
Your computer's screen. Signals are sent to it from the video card.

Motherboard
The main printed circuit board which houses processor, memory and other components.

N

Network
A network is a group of computers linked together with cable. The most common form of network is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. All the PCs on a LAN are connected to one server, which is a powerful PC with a large hard disk that can be shared by everyone.

O

OS (Operating System)
The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

PC Card
Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit card-sized cards.

PDA (Personal Digital Assistant)
Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local bus)

PCMCIA (See PC Card)

Package (See Applications)

Parallel ports
Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pentium
Fast 32-bit processor with a built-in 16Kb cache. Now the standard on PCs. It is about to be replaced by the Pentium MMX chip which has extra instructions and a 32Kb cache. The Pentium Pro is a higher-end workstation CPU with 256Kb cache meant for full 32-bit operating systems like Windows NT.

Pixel
Picture element. The smallest addressable dot displayed on a monitor.

PowerPC
This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor
Chip which does most of a computer's work.

Programs (See Applications)

Public domain
Software that is absolutely free. The author usually retains the copyright but you can make as many copies as you want and pass them to other people. "Public domain" software is often confused with "shareware".

Q

QWERTY
The name of a standard English-language keyboard, derived from the first six letters in the top row. French equivalent is AZERTY.

R

RAM (Random Access Memory)
(See Memory)

Reboot
(See Boot)

RISC (Reduced Instruction Set Computing)
These are beginning to replace CISC (Complex Instruction Set Computing) as they're usually faster. The PowerPC chip is a typical example.

ROM (Read Only Memory)
(See Memory)

RTF (Rich Text Format)
(See ASCII)

S

SCSI
Small Computer System Interface is a bus that comes as standard in a Macintosh and is beginning to rival EIDE on PCs.

Serial port
Serial ports (com1 and com2) are used by your PC to communicate with the outside world. Mostly used by modems and similar devices which communicate quite slowly. Faster communications are achieved through the parallel port.

Shareware
A method of distributing software. It is freely available, but not free of charge. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)
The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities up to 16Mb.

T

Tape streamer
Magnetic tape recorder for backing up data from a hard disk.

U/V

UART (Universal Asynchronous Receiver Transmitter)
Pronounced "you-art", this is a chip that allows your PC to cope with high-speed communications.

V.34 Plus, V.34, V.32bis
A series of CCITT standards which define modem operations and error correction. There are more than 20, but the key ones are:
- **V.32bis**, the standard for 14.4Kbps (kilobits per second) modems.
- **V.34**, the standard for 28.8Kbps modems (see Baud).
- **V.34 Plus**, the new standard for speeds up to 33.6Kbps.

VESA (See Local Bus)

VGA
Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)

VRAM (See Memory)

W

Windows
A GUI (Graphical User Interface) developed by Microsoft. Windows is intended to make programs easier to use by giving them a standard, mouse-driven interface.
- **Windows 3.11** 16-bit operating system.
- **Windows NT** Robust, fully 32-bit operating system from Microsoft. The latest, version 4.0, features a Windows 95 interface.
- **Windows 95** Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.

Winsock
Short for "sockets for Windows". The Winsock.dll is an extension for Windows which is necessary for connecting to TCP/IP networks.

World Wide Web
Service on the internet using special software called web browsers (Netscape and Internet Explorer are two best-known browsers) to give access to pages of information with text, pictures and multimedia.

WYSIWYG
"What You See Is What You Get": what you see on the screen is exactly what you will get when you print out your work.

Z

ZIF (Zero Insertion Force)
Sockets used for large CPUs. Lifting a handle enables you to remove the processor.

ZIP
The common standard for compressing files so that they take up less space. Zipped files have the extension .zip and are compressed and decompressed using shareware utilities such as Winzip and PKZip.

Buying a **Printer**

There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work much like photocopiers. They are cheap to run and print quickly. The disadvantage is the higher initial cost and mono output. Laser printers are available in all sizes and all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive; typically £5,000 or more.

Types of laser
PCs print by sending a description of the page to be printed down a printer cable. There are three commonly-used page description languages (PDLs):

- PostScript

This sends an outline in vector form (see Drawing Software) to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so the image looks the same on a monitor (75dpi), a laser printer (300dpi) and a professional image-setter (2,400dpi).

- PCL (Printer Control Language)

Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using PCL tend to be cheaper than PostScript ones, but output will vary from one machine to another, making it less well suited to professional use.

- GDI (Graphical Device Interface)

These printers download the description of your page, already used by Windows, straight to your printer. They only work with Windows but are cheap and fast. They are only suitable for a personal printer and will not work across a network.

Inkjets

Inkjets work by spraying ink onto paper. There are still some mono inkjet printers available, but it is best to stick with a colour inkjet as the price difference is negligible. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good-quality colour, especially on high-resolution paper.

PCW Recommended products

Inkjet printers

Canon BJC-80: RRP £233;
Canon 0121 680 8062 (*PCW* January 98)

ALPS MD-1000: RRP £299;
ALPS 0800 973405 (*PCW* January 98)

Canon BJC-4650: £279 (ex VAT);
Canon 0121 680 8062 (*PCW* April 1998)

Laser printers

- **Cheap: Panasonic KX-P6300** £217;
Panasonic 0500 404041

Kyocera F5-600: £280; Kyocera 01734 311500 (*PCW* February 1998)

- **Sub-£750: Hewlett-Packard 5P:**
HP 01344 369222 (*PCW* November 95)

Hewlett-Packard 5M: RRP £1,659 ex VAT;
HP 01344 369222

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Buying a **Multi Function Device**

For home use and in small offices, a hybrid device could be the answer.

Typically, MFDs combine a printer, a fax machine and photocopying and scanning capability into one device. And while this saves space, it does have some drawbacks. For one thing, they tend to be based on inkjet technology which means higher running costs and lower speeds than laser-based units. Many only offer black-and-white printing: while colour models are appearing in greater volume, they tend to be based on earlier inkjet printing technologies rather than the current state-of-the-art models. Also, the scanning quality is no match for a dedicated scanner: it's normally only 200dpi, which is the same quality as a fax machine and, worse, often black-and-white only. Finally, there's one fundamental problem — if your MFD breaks down, you won't be able to print or receive faxes. That said, they are here to stay, and some people love 'em.

PCW Recommended products

Hewlett-Packard OfficeJet: £650; HP 0990 474747 (*PCW* January 97).

Buying a **Digital Camera**

Just about every camera manufacturer now offers a budget-priced device and prices start from as little as £135.

A digital camera works like a conventional camera except that instead of a film, it has a grid of light-sensitive elements. These convert light into a voltage proportional to the brightness, which is then converted into digital information the PC can understand.

The elements produce a colour bitmap file, typically of 640 x 480 pixels, although models boasting 800 x 600, 1024 x 768 and even higher resolutions are becoming increasingly common.

Most digital cameras use flash memory to store images, and offer a wired connection to a computer — slow serial on budget models or fast SCSI on professional ones.

Some cameras feature removable memory cards, usually compatible with the PC Card standard. Quality is getting better all the time, but to match the print quality of a 35mm film camera today, you'll still have to spend thousands of pounds. The current crop of entry-level to mid-range cameras are, however, more than suitable for electronic publishing on CD-ROM or the internet.

PCW Recommended products

Sony DSC-F1: £546; Sony 0990 424424 (*PCW* January 98)

Sanyo Digicam: £449.99; Sanyo 01923 477295 (*PCW* January 98)

Epson Photo PC: £781.38; Epson 0800 289622 (*PCW* Jan 98)

Choosing an **ISP**

With over 100 ISPs to choose from, selecting an Internet Service Provider has never been so difficult.

All ISPs (Information Service Providers) allow you to send and receive email across the Internet, browse and surf the world wide web and download files from Internet servers. But there are big differences between the quality of service that each provides in terms of technical support and the quality of software supplied when you first sign up. Usually they charge a flat monthly rate for Internet access of around £10, but on top of that you also have to pay for your phone charges

Choosing a Content Provider

There are really only three players in this field: AOL, Compuserve and MSN. They are not the best or fastest way of browsing the world wide web. Instead they aim to supply their own content in the form of discussion areas, online magazines and easily searchable file libraries. All these services offer free trials which is a good way of finding out if they're for

PCW Recommended products

Our PCW Award winners in July 97:

Pipex Dial: Major player with an excellent reputation.

BT Internet: BT has now got its act together with internet service provision.

Direct Connection: One of the best of the smaller ISPs.

Content providers

AOL: 0171 385 9404; Consumer-orientated service that offers good performance even for users of older 14.4K modems.

CompuServe: 0800 289378; more business content than AOL.

Buying a **Monitor**

Regardless of your computer application, you'll be looking at your monitor all day, so make sure you get a good one.

Some people claim not to see monitor flicker, but your brain does, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors.

Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes. The resolution refers to the number of dots (pixels) horizontally and vertically on-screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on the screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 x 768 non-interlaced at 70Hz or higher.

The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in screen may only have a 14.5in visible area, and a 17in may have only 16in visible. Aperture grille tubes such as Sony's Trinitron or Mitsubishi's Diamondtron are very bright, but need two fine but visible wires running across the screen for stability.

PCW Recommended products

Mitsubishi DiamondPro 700 (£395 ex VAT); Iiyama Vision Master Pro 17 (£409 ex VAT); Nokia 447ZA (£375 ex VAT); Belinia 10 70 15 (£289 ex VAT). *See group test, p192, this issue, for details.*

Contacts Panasonic 0500 404041; Taxan 01344 484646; ADI 0181 236 0801; Iiyama 01438 745482

Buying a **Scanner**

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

These are the most common type of scanner, and cost from around £300 to more than £3,000.

They are capable of scanning colour pictures to a high standard. Most have transparency adaptors as optional extras.

Document scanners

A new category of scanner which aims to combine the reliability of a flatbed scanner with speed and portability. They are intended for OCR and document management. Most will cope with photographs and some with colour, but it's not really their forté.

PCW Recommended products

Document scanners

Visioneer PaperPort VX: street price £299; Computers Unlimited 0181 200 8282
Logitech PageScan Colour: street price £155; Logitech 01344 894300

Flatbed scanners

• **Intermediate**
Agfa Studio Star: street price £499 (ex VAT); Agfa 0181 231 4906 (*PCW* August 97)

• **Budget**
Umax Astra 610P: £99; IMC 01344 871329 (*PCW* February 1998)
Microtek Phantom 4800: £147; Midwich Thame 01379 649200 (*PCW* February 1998)

Buying a **Storage Device**

For backup and storage there's a range of devices available — conventional tape backup devices, superfloppies like the LS120 and proprietory systems like the Iomega Zip drive.

Additional storage devices, taking removable media, offer endless capacity. Iomega's ZIP drive and OR Technologies' a: drive (aka LS120) offer 100Mb and 120Mb respectively. The a: drive is an alternative to a floppy as it is compatible with normal floppies. The ZIP drive only works with ZIP cartridges.

Iomega's Jaz drive and SyQuest's SyJet, take 1Gb and 1.5Gb respectively. The SyJet is quicker and boasts cheaper media, but it's new as against Iomega's proven device.

Larger storage means slow, cheap tape drives with big capacity, perfect for overnight backup. Most quote compressed capacity, double "native" uncompressed capacity. DAT DDS-2 drives offer 4Gb native, which Seagate matches with faster Travan TR4 cartridges on its TapeStor 8000. Iomega's cheaper, slower Ditto 2000 offers 2Gb compressed backup.

CD recorders, offering double-speed writing and quad-speed reading, are around £400 ex VAT. The fastest are 24-speed, but there's little benefit in anything over 12.

PCW Recommended products

Iomega ZIP Plus: £169.99 (£144.68 ex VAT); Iomega 0800 973194 (*PCW* March 98)

Iomega JAZ drive: internal £189 ex VAT; 1Gb media £60 ex VAT; Iomega 0800 973194 (*PCW* August 1997)

Iomega Ditto 2000: external £89 ex VAT; Iomega 0800 973194 (*PCW* July 97)

Seagate TapeStor 8000: internal £220 ex VAT; Seagate Technology 01628 890366 (*PCW* July 97)

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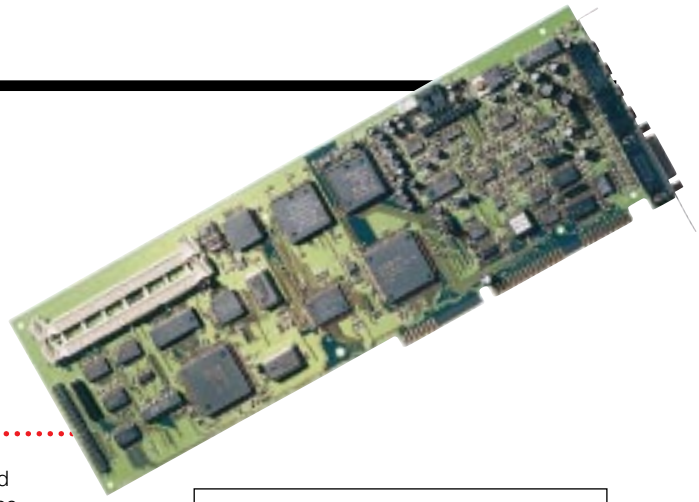
Buying a **Sound Card**



You need one of these to add sound capability to your PC.

Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better sound cards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable. The newer cards are also plug and play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

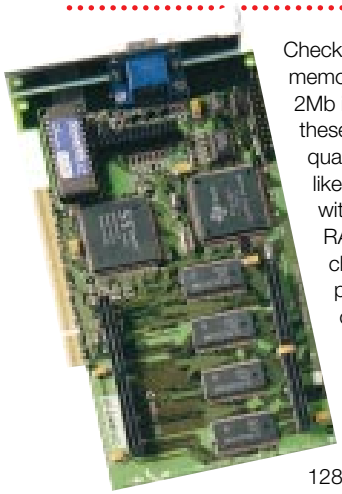
PCW Recommended products

AWE 64 Gold: £199; Creative Labs 01734 344322 (*PCW* June 97)

Maestro 32/96: £139; Terra Tec 01635 294394 (*PCW* June 1997)

Buying a **Graphics Card**

The graphics card sits inside the PC and controls the features which the software displays on the monitor.



Check the amount of memory on the card. 2Mb is standard these days. Better-quality cards are likely to be fitted with VRAM (Video RAM). Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit: a large number of bits means faster performance.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution that the card supports in Windows. This is measured by the number of pixels the card displays on-screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz.

A 2Mb card can display 16-bit colour (65,000 colours) at 1,024 x 768 pixels. A 1Mb card can manage only 8-bit colour (256 colours) at 1,024 x 768 pixels. To display 24-bit colour (16 million colours) at 1,024 x 768 you'll need 4Mb of memory. The refresh rate (measured in Hz) is important, too. It represents the number of frames displayed on-screen per second. A flickering display is very tiring to use.

Find out if your video card is "local bus". Local bus (PCI or VL) is an interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU, which makes it a lot faster than the standard ISA interface.

PCW Recommended products

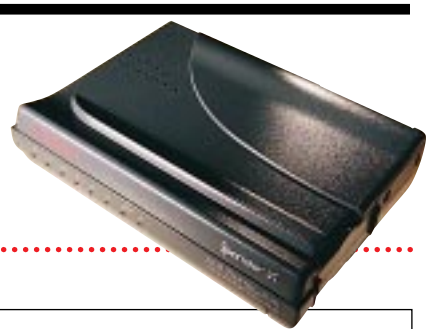
ATI Xpert@ play: £163 (4Mb); ATI 01628 533115

Hercules Stingray 128/3D: £210 (6Mb); Hercules 01635 294300

Orchid Righteous 3D: £132; Orchid 01256 479898

(*PCW* January 1998)

Buying a **Fax Modem**



You'll need a modem to connect to the internet or an online service, such as CompuServe or AOL, and also to send and receive email.

Modems are available in three formats: either as PC Cards to plug into notebooks, or as external boxes, or as expansion cards. PC Card modems are the most expensive, while external modems cost slightly more than expansion cards.

Apart from the casing and the external power supply, there is often very little difference between the internal and external versions of a modem. Most now have a built-in fax capability, which means you can receive faxes on your personal computer to view or print out.

Go for a V.34 28.8Kb/sec modem or one of the new V.34+ 33.6Kb/sec modems. Or, look out for the new 56K versions: these use one of two rival technologies but as yet are unsupported by Information Service Providers.

PCW Recommended products

• **Internal fax modem**

Pace 56 Voice: £169; PMC 0990 561001 (*PCW* November 97)

Buying **Software**

Only a few years ago there were dozens of different software applications in each category. During the past two years or so, however, there has been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and not worth considering. We've distilled each category down to just one or two recommended products.

A

■ ACCOUNTS SOFTWARE One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS.
Recommended products:
MYOB, Intuit QuickBooks.

B

■ BROWSERS are programs which are used to navigate the internet. A modern browser lets you navigate web pages, download files and send and receive email.
Recommended products:
There are only two worth talking about: Netscape Navigator and Microsoft Internet Explorer.

C

■ CAD SOFTWARE Computer Aided Design covers everything from architectural drawings, through office planning, to complex engineering drawings.
Recommended products:
AutoCAD is the industry standard but we think MicroStation 95 is a more capable product at the high end of the market. At the cheap end, DesignCAD 3D offers astonishing value for money.

■ CONTACT MANAGERS
(See PIMs)

D

■ DATABASE At its simplest, an electronic card index. For just a few hundred names and addresses an electronic-type Filofax, such as Lotus Organizer, may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most offices you are likely to use a database application that somebody else has written for you.
Recommended products:
Lotus Approach, Microsoft Access.

■ DESKTOP PUBLISHING SOFTWARE (DTP) This is software used to create newsletters, magazines, books, brochures or advertisements.

Typically, it enables you to incorporate graphics, lay out text in multiple columns and run text around graphics. You also have control over how text appears, in varying degrees of sophistication.
Recommended products:
The high-end market leader is Quark XPress on the Mac. On the PC, PageMaker is strong. For serious work on a budget we recommend Serif Publishing Suite, and for sheer ease of use, Microsoft Publisher.

■ DRAWING SOFTWARE Programs for drawing, which work using vectors. This means each shape drawn is described using mathematical equations.
Recommended products:
At the budget end of the market, MicroGraphx Windows Draw 5 stands out. At the professional end, Corel Draw 7 gets our vote.

■ IMAGE EDITING SOFTWARE A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing.
Recommended products:
For simple image editing the popular shareware program, PaintShop Pro, is fine. For professionals, Adobe's Photoshop is the industry standard.
■ INTEGRATED PACKAGES Typically, these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another but integrated packages tend to lack some of the advanced features of individual applications.
Recommended product:
Microsoft Works.

J

■ JAVA. A language based on C++, but easier to learn and use. Java runs on a "virtual machine" interpreter, so programs can run on many different platforms.
Recommended products:
Borland JBuilder

M

■ MULTIMEDIA AUTHORING TOOLS Programs designed for producing interactive multimedia applications; typically for training applications or for CD-ROMs. The software lets you control and manipulate different types of media such as sound files, audio files, video clips and graphic files.
Recommended product:
Macromedia Director, the product used to produce *PCW*'s cover-mounted CD-ROM, gets our vote.

O

■ OCR SOFTWARE Optical Character Recognition software converts printed text into computer text you can edit. You will need a scanner or fax card to get the printed text onto your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.
Recommended products:
OmniPage is the best product we have found, but TextBridge offers most of the same capabilities for less cash.

P

■ PERSONAL INFORMATION MANAGERS (PIMs) PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients.
Recommended products:
SideKick 95 and Organizer are excellent PIMs. For contact managers we would recommend Goldmine for Windows.

■ PRESENTATION GRAPHICS Increasingly, the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips.
Recommended products:
Powerpoint and Freelance 97 are both capable products sold with Microsoft Office and SmartSuite respectively.

■ PROGRAMMING TOOLS Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which, although much easier to use, generally sacrifice performance and flexibility in the process. Commercial programs like Word for Windows are written using low-level languages. Bespoke applications and prototypes are often written using Delphi or Visual Basic.
Recommended products:
Delphi 3.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Optima Power++ is the pick of the high-end Windows development tools.

■ PERSONAL FINANCE PACKAGES These help manage home finances. They are also well suited to some small businesses and tend to be easier to use than full-blown accounts packages.
Recommended product:
Quicken is the outstanding product in this category and has no serious rivals.

■ PROJECT MANAGEMENT Programs for managing large projects — anything from building a power station to planning a

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marketing campaign.
Recommended product:
SuperProject 4.0 for Windows.

R

■ REMOTE CONTROL S/W Lets you access and control a PC remotely, usually via a modem.
Recommended product:
ReachOut, for its simple interface and support for different networks, particularly TCP/IP.

S

■ SPREADSHEET This is an electronic version of what would be an old-fashioned ledger. Excellent graphing and charting facilities are included.
Recommended products:
Lotus 1-2-3, Microsoft Excel.

■ SUITES Most general business software is now sold in suites.

Two suites are widely available: Lotus SmartSuite and Microsoft Office. Lotus SmartSuite also contains a database. With Microsoft Office, you pay extra for Office Professional which contains Microsoft's Access database.
Recommended product:
Microsoft Office is close to the industry standard. Its high level of integration gives it the edge over the opposition.

V

■ VISUAL PROGRAMMING (see Programming Tools)

W

■ WEB EDITORS Programs designed to do for web page design what DTP did for magazines and newsletters. They let you create web pages without writing HTML. You can incorporate graphics, backgrounds, tables, images and sounds.
Recommended products:
HotMetal Pro 3.0 is our first choice, while Adobe Pagemill is a capable alternative.

■ WORD PROCESSOR An application in which you can write letters and prepare reports, or produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding columns of figures.
Recommended products:
Microsoft Word is the clear market leader but WordPro is a capable alternative.

A-Z of Recommended **Software Products**

■ *If you would like to read any of the reviews of software listed here and do not have the original issues, you can order* Personal Computer World *on CD-ROM. It costs just £9.95 (including postage and packing).* *See pages 370/371 for full details.*

	Category	Product	Supplier	Contact	Price (ex VAT)	Date of *PCW* review
A	Accounts	Sage Instant Acctng.	Sage	0800 447777	£84.26	April 1998
	Accounts	QuickBooks	Intuit	01932 578501	£125	April 1997
B	Browsers	Netscape Navigator	Netscape	0181 564 5100	£49	Mar 1997
	Browsers	Internet Explorer	Microsoft	0345 002000	Free	Jun 1996
C	CAD	Microstation	Bentley	01344 412233	£3,495	Jan 1997
	CAD	DesignCAD 3D	BVG	01874 611633	£149.95	Jan 1997
D	Database	Approach 97	Lotus	01784 455445	£40	Oct 1997
	Database	Access 97	Microsoft	0345 002000	£235	Oct 1997
	Desktop publishing	XPress 3.3	Quark	01483 454397	£795	May 1997
	Desktop publishing	Publisher	Microsoft	01734 270000	£70	May 1997
	Desktop publishing	Publishing Suite 3.07	Serif	0115 9421502	£99	May 1997
	Drawing	CorelDraw 7	Corel	0800 973189	£495	Sept 1997
	Drawing	Windows Draw 5	MicroGraphx	0345 089372	£38.30	Sept 1997
I	Image editing	Photoshop	Adobe	0181 606 4000	£382	Dec 1996
	Image editing	PaintShop Pro	Digital Workshop	01295 258335	£49.95	Jun 1995
	Integrated package	Works/Win 95	Microsoft	0345 002000	£93.61	Apr 1997
J	Java programming	JBuilder	PowerSoft	01628 597100	£399	N/A
M	Multimedia authoring	Director 5.0	Macromedia	0181 200 8282	£99	Oct 1996
O	OCR	PaperPort Plus	Visioneer	0800 973245	£58.72	Dec 1997
	OCR	Presto! OCR Pro 3.0	Guildsoft	01752 895100	£58.72	Dec 1997
P	Personal finance	Quicken	Intuit	0800 585058	£34	May 1996
	PIM/contact manager	Organizer 2.1	Lotus	01784 455445	£99	Jun 1997
	PIM/contact manager	Goldmine 4.0	AVG Sales & Mktg.	0171 335 2222	£195	April 1998
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Jun 1997
	Presentation graphics	Freelance	Lotus	01784 445808	£42	Mar 1998
	Presentation graphics	Powerpoint	Microsoft	0345 002000	£277	Mar 1998
	Programming tools	Power ++ 2.0	PowerSoft	01628 597100	£345	Sept 1997
	Programming tools	Delphi 3.0	Borland	01734 320022	£89	Apr 1997
	Project management	SuperProject 4.0	Computer Associates	01753 679679	£495	May 1996
R	Remote control/Access	PC Anywhere	Symantec	01628 592320	£139	Nov 1997
S	Spreadsheet	Excel	Microsoft	0345 002000	£220	May 1995
	Spreadsheet	1-2-3	Lotus	01784 455445	£365	May 1997
	Suite	Office (Standard)	Microsoft	0345 002000	£360	Jul 1997
	Suite	Office (Professional)	Microsoft	0345 002000	£460	Jul 1997
W	Web authoring	HoTMetal Pro 4.0	SoftQuad	0181 387 4110	£69	Jan 1998
	Web authoring	FrontPage 98	Microsoft	0345 002000	£99	Jan 1998
	Word processing	Word	Microsoft	0345 002000	£220	Oct 1996

ChipChat

There'll be moo-sic everywhere

The latest exciting glance into Bill Gates' life, courtesy of his diary on www.slate.com: "Melinda and I got back to the hotel room about midnight and considered calling Jennifer at home (there's a three-hour time difference). She is almost two and we can ask her exciting questions over the phone now, like: 'What sound does a cow make?' I love the way she says, 'Moo'. However, we decided it was too late to call."

Ah… never mind, Bill, you can phone *Chipchat* any time of the day or night and you'll get all the "Moos" your sweet little heart desires.

Searching for the young soul rebels

Rumours abound of Netscape engineers, with the free-code giveaway deadline looming, scrambling to locate and remove amusing obscenities that programmers have scattered throughout the program.

Harmless enough fun perhaps, but *Chipchat* has heard whispers of a more sinister nature. Running the Netscape code backwards, some users claim to hear a scratchy ethereal voice emanating from their internal PC speaker repeating, *ad nauseam*: "Bill is good, trust in Bill".

Rest assured, *Chipchat* is not prey to such supernatural twaddle and the thrice daily mouthwash of garlic and holy water is being taken purely on doctor's orders.

The sound of silence

Avid *Chipchat* readers will have noticed a big blank space in last month's thrilling reportage. We had planned to print a particularly juicy story about John Major, a drunken polar bear and Tara Palmer-Tomkinson, but had to pull it at the last minute… because it wasn't true.

Caption competition

Left "It's a big moustache, certainly, but is it art?"

■ Think you can do better than this? Enter via our web site at www.pcw.co.uk or write to the usual address (p10) with your caption(s) on a postcard marked "May Caption Compo" before 15th April. We'll print the funniest entry in all its glory and the winner will receive a £20 book token.

"So YOU'RE the one who installed Internet Explorer 4!"

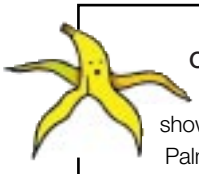
Congratulations to Alan Tracey from Totton, winner of March's competition.

Sweet dreams are made of this

Another, somewhat more puzzling excerpt from Bill Gates' diary: "There is no more open market than internet browsers. Consumers can use any internet browser they want just by taking five seconds to download a new browser." Oh, really?

…meanwhile, this is planet Earth

The year 2000 strikes again with the launch of the Millennium Countdown Clock. Combining the functions of a normal clock and a countdown device, the timepiece "creates awareness and excitement every day until the millennium". Guess what happens at midnight, 31st December 1999…?



OOPS

■ Our PDA group test (p242) shows two prices for the 3Com Palm Pilot. The correct one is at the end of the review, and is Pro £229 and Personal £169 (both incl VAT). We printed the wrong graph for the £2,000 PCs in this month's group test (p192). The correct version is printed opposite.